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MOLLUSCA.—II.

(TROCHOMORPHIDÆ—JANELLIDÆ.)

BY

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PREFACE.

The first volume of the Land Mollusca, forming part of the 'Fauna of British India' series, and comprising the families of Testacellidæ and Zonitidæ, was issued in 1908 under the joint authorship of the late Dr. W. T. Blanford and Lieut.-Colonel H. H. Godwin-Austen.

It was at first anticipated that the second volume would be the joint production of Lieut.-Colonel Godwin-Austen and the present writer. Unexpected circumstances have, however, unfortunately deprived me of the advantage of the former's cooperation. This is the more to be regretted as it involves the loss of a considerable quantity of additional anatomical details, the result of his recent researches, which would have greatly increased the value of the present volume; and, further, that his own collection and that of the late Dr. Blanford—both very rich in Indian Mollusca, and both in the custody of the British Museum—have in consequence been inaccessible to me.

Very valuable assistance in the preparation of this work has been rendered by many malacologists, both at home and abroad. Foremost among these I would thank Mr. E. A. Smith and Mr. John H. Ponsonby for advice on many critical points. The latter, besides giving me free access to his extensive collection, has in addition very kindly looked through the proofs and offered many valuable suggestions. Mr. G. C. Leman, the present owner of the late Colonel Beddome's collection—unrivalled in its wealth of Indian shells, has very generously placed much valuable material at my disposal, and Mr. G. C. Robson has greatly facilitated

my research amongst the rich material in the National Collection. Finally, I am under a deep obligation to the following for the loan of specimens from their own collections or from collections in their charge :—Mr. John M. Clark, of the State Museum, Albany, New York ; Dr. L. Doncaster, of the University Museum of Zoology, Cambridge; Dr. Fritz Haas, of the Senckenbergisches Museum, Frankfurt a/M.; Mr. A. S. Kennard; Major A. J. Peile; Mr. F. R. Rowley, of the Royal Albert Memorial Museum, Exeter; Dr. R. Sturany, of the Naturhistorisches Hofmuseum, Vienna; and Mr. B. B. Woodward.

G. K. GUDE.

London, *November*, 1914.

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ERRATA.

Page 38, delete *Pupisoma seriola.*

" 94, 7th line from the bottom, *for* Shiroifurar *read* the Shiroifurar Peak.

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Family TROCHOMORPHIDÆ.

Genus **TROCHOMORPHA**, *Albers.*

Trochomorpha, Albers, Die Heliceen, 1850, p. 116; Martens, Die Heliceen (ed. 2), p. 60; ibid., Preuss. Exp. Ost-Asien, Zool. Theil, ii, 1867, p. 245; Stoliczka, J. A. S. B. 1873, p. 20; Pilsbry, Man. Conch. (ser. 2), ix, 1893, p. 1; Godwin-Austen, Proc. Malac. Soc. London, i, 1895, p. 284.

Type, *Helix trochiformis*, Fér., from Tahiti.

Range. India, Burma, Andaman and Nicobar Islands; Farther India and adjacent islands; China and Formosa; Japan and Loo-Choo Islands; Malaysia; Philippine Islands; New Guinea, Admiralty and Louisiade Archipelagoes; Pelew, Caroline, Marshall, Solomon, New Hebrides, Fiji, Navigator, Tonga, Society, and Sandwich Islands.

Original description:—"Testa trochiformis, plerumque aperta umbilicata, angulata vel carinata, apice obtusa, striatula, opaca, subsolida, fusca, concolor vel fasciata; anfr. 5–8, supra et infra planati; apertura depressa, obliqua, securiformis vel angustius lunata, peristoma rectum, simplex, margine columellare sæpius paulum incrassato, sensim in basalem transeunte.

Maxilla lævis, arcuata, medio sæpius rostrata. Pallium non ultra aperturam testæ productum." (*Martens*, 1867.)

The genus *Trochomorpha* was established by Albers in 1850. He included sixteen species, not only of Asiatic and Polynesian origin, but also one from Central America, two from the Bermudas, and one from the Canary Islands. Of the sixteen species, eleven have since been referred to other genera. No type was mentioned. In 1860 von Martens, in the revised edition of Albers' work, gave a list of 31 species, having eliminated some and added a number of others, comprising several which have no affinity with the genus. He indicated *trochiformis* as the type. In the 'Preuss. Exp. Ost-Asien' he amended and amplified the description, which bears evidence of a better conception of the limits of the group. It was, however, left for Prof. Pilsbry, in his epoch-making work on the *Helicidæ*, to place the genus on a sound and permanent basis by giving anatomical details of several forms, and enumerating all the species known at the time. Although including it in his work on *Helicidæ*, he distinctly states that he considers *Trochomorpha* "a somewhat aberrant genus of *Zonitidæ*." Further anatomical details of the genus were contributed in 1895 by Lt.-Col. Godwin-Austen, who, however, retains the subgeneric name *Discus*, which, as Pilsbry has demonstrated, is not available in this group, Fitzinger having previously employed it for *H. rotundata* and its allies, so that *Videna* of Albers has to be employed instead.

I append anatomical details copied from Pilsbry's work referred to:—

"Animal: Foot long and rather narrow; sole flat, *with no trace of longitudinal division; parapodial groove distinct*, bounding a wide vertically grooved foot margin, and having a shallower groove above it. Tail depressed above, rounded behind, *without a mucus gland*. Back with several indistinct longitudinal rows of granules; sides irregularly granular. Shell lappets none; but mantle having a wide body-lappet on the right and a small one on the left. Lung orifice to the left of the superior angle of aperture.

"*Genitalia simple*, the penis moderately long, somewhat twisted, the retractor muscle and vas deferens entering at the apex. Spermatheca on a short duct. Orifice of genitalia near the pedal groove, below and slightly back of the right eye-peduncle. Right eye-peduncle retracted between branches of genitalia. Kidney long and narrow.

"In *T. castra* and *T. timorensis* the duct of the spermatheca is very long. In all other features of genitalia, jaw, and teeth they resemble the typical Trochomorphas. The length of this duct may warrant the retention of the section *Sivella*, Blanf.

"Jaw arcuate, smooth, with a small median projection, or none.

"Radula: *central and lateral teeth having the strong mesocones projecting well over the posterior borders of their basal plates, and lacking ecto- and entocones.* Outer lateral teeth at first sinuated outside, the sinuation increasing to a denticle on the transition teeth, and *ascending on the mesocone to form the long bifid cusps of the marginal teeth*, which become very oblique.

". . . . . . . Wiegmann has recently dissected a specimen of *T. planorbis*, Less. (Weber's Zool. Ergebn. Reise Niederl. Ost-Indien, iii, p. 152, 1893). This species shows the lower portion of the vas deferens to be dilated beyond the axis of the penis, where the retractor muscle is inserted. The vagina is much swollen between the lower end of the uterus and the opening of the spermatheca duct, and at the upper end of this swollen portion there is inside a whitish gland formed of the one-celled club-shaped follicles. This internal vaginal gland has not been noticed in other species. Stoliczka has published the anatomy of *T. castra* and *T. timorensis* (Journ. As. Soc. Bengal, xlii), finding these species to have the structure of typical *Trochomorpha* except for the very long duct of the spermatheca." (*Pilsbry.*)

Godwin-Austen investigated the anatomy of *T. trilineatus* and gives the following details:

"*Animal.*—Has no overhanging lobe at the extremity of the foot: the slit of the mucous gland cannot be discerned owing, possibly, to the contracted state of the spirit specimen, though the wide pallial fringe and the shape of the extremity of the foot point undoubtedly to its presence. The animal is black in colour, with a pale foot beneath, and above the pallial margin is finely papillate. The jaw has a central projection. The radula has

the teeth arranged +9:11:1:11:9+? It was unfortunately imperfect on both the lateral sides, where the teeth are very small. The twenty-two centrals are plain straight-sided teeth, the centre tooth not so broad as those on either side; the laterals are curved, short, and evenly bicuspid.

"The generative organs.—The *vas deferens* joins the male organ below the retractor muscle attachment, and at its junction is closely coiled upon itself; this was seen in two specimens dissected. The spermatheca is only of moderate length, and thus these organs have a very distinct construction to that which Stoliczka describes in *Sivella castra*. The other parts of the generative organs do not call for any special mention."

Subgenus **SIVELLA**, *Blanford.*

Sivella, Blanford, A. M. N. H. ser. 3, xi, 1863, p. 86; Pilsbry, Man. Conch. ser. 2, ix, 1893, p. 3.

TYPE, *Helix castra*, Benson.

Range. India and China.

Shell depressed, acutely keeled, thin; umbilicus wide. Spermatheca with a long duct.

The only species of this group which appears to have been examined anatomically is the type. Godwin-Austen states (Proc. Zool. Soc. 1895, p. 450):—"It differs in every respect from *Discus* [*Videna*], represented by *bicolor*, *sulcipes*, &c." As he refers all the forms from the Andaman and Nicobar Islands to *Discus*, and as conchologically the two subgenera are indistinguishable, the only logical conclusion appears to be that the continental species should be classed under *Sivella* and the insular ones placed in *Videna*, until an examination of the soft parts shall prove the contrary.

1. **Trochomorpha castra**, *Benson.*

Helix castra, Benson, A. M. N. H. ser. 2, x, 1852, p. 349; Reeve, Conch. Icon. vii, 1853, pl. 172, fig. 1160; Hanley & Theobald, Conch. India, 1872, pl. 83, figs. 1–3.

Trochomorpha castra, Stoliczka, J. A. S. B. 1873, p. 21, pl. i, figs. 14–16 (shell), pl. ii, figs. 7–9 (anat.); Nevill, Hand List, i, 1878, p. 56; Martens, Conch. Mitth. ii, 1883, p. 130; Collinge, Journ. Malac. ix, 1902, p. 81.

Sivella castra, Blanford, A. M. N. H. ser. 3, xi, 1863, p. 86; Godwin-Austen, Proc. Mal. Soc. London, i, 1895, p. 284, pl. ix, fig. 5 (anatomy).

Trochomorpha (Videna) castra, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 84.

Helix (Trochomorpha) castra, Tryon, Man. Conch. ser. 2, iii, 1887, p. 84, pl. 16, figs. 5–7.

Original description:—"T. mediocriter umbilicata, depressissimo-conica, tenuis, exiliter oblique acuto-striatula, cornea; spira ad apicem obtusa, sutura marginatis; anfr. 5½ planulati,

ultimo ad peripheriam acutissime carinato, subtus planiusculo; apertura oblique subquadrata, margine acuto.

"Diam. maj. 12, min. 10½, axis 4 mill."

Hab. Sikkim: Darjeeling (*Trotter, Stoliczka & Mainwaring*). India: Sinkip Island (*Wood-Mason*); Calcutta (*Stoliczka & Nevill*); Sibsagar (*Peal*); Khasi Hills and Dafla Hills, Assam (*Godwin-Austen*); Naga Hills (*Chennell*); Cherrapoonjee, Assam (native collector, my collection). Burma: Arakan Hills (*Kurz*); Pegu (*Stoliczka*). Straits Settlements: Penang (*Stoliczka*); Salang (*Weber*); Kwala Arirg, Kelantan, Malay Peninsula (*Skeat Expedition*).

Nevill records an unnamed variety of this species (collected by Wood-Mason) from South Andaman Island (Hand List, i, 1878, p. 56). Lt.-Col. Godwin-Austen, who received a specimen from the same collector, believes this to be an immature *T. sanis* (P. Z. S. 1895, p. 449).

2. **Trochomorpha ceryx**, *Benson.*

Helix ceryx, Benson, A. M. N. H. ser. 3, iii, 1859, p. 184 (reprint, p. 1).

Helix (*Trochomorpha*) *caryx* (err. typ.), Tryon, Man. Conch. ser. 2, iii, 1887, p. 75.

Trochomorpha caryx, Pilsbry, Man. Conch. ser. 2, ix, 1893, p. 4.

Original description:—"Testa perforata, turbinato-conica, tenui, nitidula, oblique striatula, liris pluribus remotis, striisque confertissimis interpositus spiralibus sculpta, translucente, albida, fasciis duabus latis fuscis, superiori prope suturam, altera infra peripheriam, ornata; spira attenuato-conica, apice obtusiusculo; anfractibus 4 convexiusculis, ultimo medio carinato; apertura obliqua, rotundata, peristomate tenui, acuto, margine columellari verticali anguste reflexo, perforationem subtegente.

"Diam. maj. 6, min. 5, axis 5 mill."

Hab. Burma: Pie Than, Tenasserim.

3. **Trochomorpha billeana**, *Mörch.*

Nanina (*Videna*) *billeana*, Mörch, Journ. Conchyl. 1872, p. 310; ibid., 1876, p. 355.

Discus billiana, Godwin-Austen, P. Z. S. 1895, p. 442.

Original description:—"T. substantia dura, unicolor fusca, perspective umbilicata, depressa, subdiscoidea, acutissime carinata; striæ incrementi obsoletæ, lineæ spirales vix detegendæ; supra parum elevata; sutura linearis, expansa; anfra. 5½ planiusculi, pone suturam (vel aciem) excavati, ultimus vix descendens, basi convexiusculus. Apertura rhombea, peristomate subobliquo, margine subincressato, labro obliquo, obsolete sinuato.

"Diam. maj. 13, min. 11½, axis 4 mill."

Hab. Nicobar Islands: Nancowri, Great and Little Nicobar (*Reinhardt*); Camorta (*Roepstorff*).

The form collected at Camorta is distinguished by Mörch as

var. *β*, and is stated to be of a brown colour, with a thinner shell. The species differs from *T. sulcipes* principally by the narrower whorls, but the shell is also more solid, the umbilicus is narrower, the keel is sharper owing to the whorls being excavated above and below, while the spiral striæ are less numerous and more indistinct.

4. **Trochomorpha frauenfeldi**, *Zelebor.*

Helix frauenfeldi, Pfeiffer & Zelebor, Verh. K.K. zool.-bot. Ges. xvii, 1867, p. 805.
Trochomorpha ? frauenfeldi, Frauenfeld, Verh. K.K. zool.-bot. Ges. xix, 1869, p. 897.
Rotula frauenfeldi, Godwin-Austen, P. Z. S. 1895, p. 441.

Original description:—"T. perforata, lenticularis, acute carinata, tenuis, oblique conferte costulato-striato, parum nitida, translucida, cornea; spira parum elevata, vertice obtuso; sutura linearis; anfr. 5 regulariter accrescentes, planiusculi, ultimus non descendens, infra carinam levissime crenulatam convexus, lævior, nitidus; apertura obliqua, rhombeo-lunaris; perist. simplex, rectum, margine basali arcuato, ad insertionem breviter triangulatim reflexo.

"Diam. maj. 16, min. 14, alt. 6 mill."

Hab. Nicobar Islands (*Zelebor*); Great Nicobar (*Godwin-Austen*).

5. **Trochomorpha galerus**, *Benson.*

Helix galerus, Benson, A. M. N. H. ser. 2, xviii, 1856, p. 96; Hanley & Theobald, Conch. Ind. 1872, pl. 83, figs. 5 & 6.
Trochomorpha castra, var. *galerus*, Nevill, Hand List, i, 1878, p. 56.
Trochomorpha (*Nigritella*) *galerus*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 81.
Helix (*Trochomorpha*) *galerus*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 75, pl. 14, figs. 2 & 3.

Original description:—"Testa umbilicata, subconoidea-depressa, lenticulari, pallide cornea, confertissime oblique striata, striis spiralibus exiguis decussatæ; spira depresse conoidea, sutura impressa, apice obtusiusculo; anfr. 5 lente acrescentibus, convexiusculus, ultimo antice majori, non descendente, peripheria acute carinato, marginato, subtus convexiusculo, margine periomphali obtuse angulato; umbilico profundo, subanguste perspectivo; apertura subsecuriformi; peristomate acuto, marginibus distantibus, columellari brevi, superne reflexiusculo.

"Diam. maj. 9, min. 8, axis 4 mill."

Hab. Ceylon: Rogama (*E. L. Layard*).

6. **Trochomorpha hyptiocyclos**, *Benson.*

Helix hyptiocyclos, Benson, A. M. N. H. ser. 3, xi, 1863, p. 89.
Patula (*Gonyodiscus*) *hyptiocyclos*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 92.

Original descriptions:—"H. testa latissime umbilicata, orbi-

culato-planata, planorbiformi, depressa, fragili, oblique striatula translucente, polita, olivaceo-cornea; spira concaviuscula, apice foveolato, suturis profundis; anfractibus 4½, gradatim increscentibus, utrinque convexis, ultimo convexiusculo, peripheria subcarinata; apertura valde obliqua, elliptico-lunata; peristomate tenui, acuto, maginibus conniventibus, callo tenui junctis.

"Diam. maj. 6, min. 5, alt. 1½ mill."

Hab. Ceylon: Fort M'Donald (*Layard*).

7. **Trochomorpha percompressa**, *Blanford.*

Helix (Sivella) percompressa, Blanford, P. Z. S. 1869, p. 448.
Trochomorpha percompressa, Nevill, J. A. S. B. 1877, p. 15; ibid., in Anderson, Zool. Res. Exped. W. Yunnan, i, 1878, p. 873, pl. 80, fig. 7; ibid., Hand List, i, 1878, p. 56; ibid., J. A. S. B. 1881, pt. 2, p. 133, pl. 5, fig. 22.
Helix (Trochomorpha) percompressa, Tryon, Man. Conch. ser. 2, iii, 1887, p. 84, pl. 16, figs. 8–10.

Original description:—"Testa aperta et pervie umbilicata, perdepressa, lenticularis, tenuis, cornea, acutissime carinata, nitida, striis incrementi oblique curvatis notata. Spira fere plana, apice vix exserto, sutura impressa marginata. Anfr. 5, convexi, ultimus carina mediana acuta utrinque compressa instructis, circa umbilicum tumidior, non descendens. Apertura parum obliqua, securiformis; peristoma tenue, rectum.

"Diam. maj. 12, min. 10½, axis 3 mill."

Hab. Burma: Bhamo (*Anderson*); 2nd Irawaddy Defile (*Anderson*).

Subgenus **VIDENA**, *H. & A. Adams.*

Videna, H. & A. Adams, Gen. Rec. Moll. ii, 1858, p. 15 (as subgenus of *Zonites*), proposed in lieu of *Discus*, Albers, 1850, not of Fitzinger, 1833; Martens, Preuss. Exp. Ost-Asien, Zool. Theil, ii, 1867, p. 247 (second group of *Trochomorpha*); Pilsbry, Man. Conch. ser. 2, ix, 1893, p. 3.

Type not indicated. First species *Helix beckiana*, Pfeiffer.

Range. Islands East of British India, Malaysia, China, Japan, Philippines, New Guinea.

Original description:—"Shell widely umbilicated, discoidal, keeled, flat, or slightly elevated above, convex at the base, last whorl slightly deflexed at the aperture; peristome simple, acute, or slightly marginate, the margins arcuated." (*Adams.*)

8. **Trochomorpha andamanica** (*Nevill*), *Godwin-Austen.*

Discus andamanica (Nevill), Godwin-Austen, P. Z. S. 1895, p. 448.
Trochomorpha (Videna) andamanica, Fulton, A. M. N. H. ser. 6, xx, 1897, p. 212, pl. 6, fig. 4.

"Shell subcircular, light yellowish brown; umbilicus wide funnel-shaped and sharply angled; whorls 6½, slowly increasing,

suture bordered with a depressed and well-defined narrow margin, obliquely striated by growth-lines above and below, last whorl compressed at the margin and acutely keeled; aperture very oblique, lip slightly thickened.

"Maj. diam. 14 millim., height $4\frac{1}{2}$ millim., width of umbilicus 5 millim." (*Fulton.*)

Hab. Andaman Islands: Port Blair.

9. **Trochomorpha bicolor**, *Martens.*

Trochomorpha bicolor, Martens, Monatsber. Kön. Akad. Wiss. Berlin, 1864, p. 267; ibid., Preuss. Exp. Ost-Asien, Zool. Theil, ii, 1867, p. 252, pl. 13, fig. 2; Nevill, Hand List, ii, 1878, p. 57.
Nanina (*Videna*) *bicolor*, Mörch, Journ. Conchyl. 1876, p. 356.
Helix (*Trochomorpha*) *bicolor*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 82, pl. 16, figs. 83–85.
Discus bicolor, Godwin-Austen, Proc. Malac. Soc. London, i, 1895, p. 285, pl. 19. fig. 3 (anatomy); ibid., P. Z. S. 1895, p. 442.
Trochomorpha (*Videna*) *bicolor*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 83; Wiegmann, Abh. Senck. Naturf. Ges. xxiv, 1898, p. 419, pl. 27, figs. 1–18 (anatomy).

Original description:—"Testa modice umbilicata, depresse conica, carinata, striatula, nitida, supra lineis spiralibus subtilibus sculpta, castanea, zona suturali, carina et regione umbilicali albidis; spira altitudine varians; anfr. $5\frac{1}{2}$–6, convexiusculi, ultimus peripheria carinatus et basi prope umbilicum subangulatus, antice haud descendens; apertura diagonalis, securiformis; peristoma rectum, acutum, margine basali arcuato.

"Diam. maj. 13, min. 12, alt. 5–6, apert. long. 5, lat. 4 mill."

Hab. Nicobar Islands: Teressa and Katchal (*Roepstorf*); Preparis Island (var.) (*Wood-Mason*); Malaysia: Sumatra, Borneo, Lombok.

10. **Trochomorpha iopharynx**, *Mörch.*

Nanina (*Videna*) *iopharynx*, Mörch, Journ. Conchyl. 1876, p. 356.
Discus iopharynx, Godwin-Austen, P. Z. S. 1895, p. 442.

Original description:—"T. depressa, late umbilicata, brunnea, linea, suturali subtilissima, alba; striæ incrementi irregularis, rudes, præsertem superne; labio crassiusculo, faucibus violascentibus, iridescentibus.

"Diam. maj. 16 millim.; diam. min. 14; alt. 8."

Hab. Nicobar Islands; Katchal (*Roepstorpf*).

Based on a single specimen. Mörch states that *Trochomorpha timorensis*, Martens, gives a good idea of this species, but that the figure given by von Martens (Ost-As. pl. 13, fig. 6) shows a much narrower umbilicus.

11. **Trochomorpha lardea**, *Martens.*

Helix zollingeri, Mousson (*non* Pfeiffer), Zollinger, Natuurk. Tijdschr. Nederl. Indie, xxi, 1860, p. 317 (nom. nud.).

Trochomorpha lardea, Martens, Monatsber. Kon. Akad. Wiss. Berlin, 1864, p. 267; ibid., Preuss. Exp. Ost-Asien, Zool. Theil. ii, 1867, p. 251, pl. 13, fig. 5; Nevill, Hand List, i, 1878, p. 57.
Helix (Trochomorpha) lardea, Tryon, Man. Conch. ser. 2, iii, 1887, p. 83, pl. 16, figs. 93–95.
Trochomorpha (Videna) lardea, Kobelt, Abh. Senck. Naturf. Ges. xxiv, 1898, p. 54; Wiegmann, tom. cit. p. 415, pl. 26, figs. 24–34 (anatomy).

Original description:—"Testa modice umbilicata, depresse conica, carinata, striatula, nitida, supra lineis spiralibus subtilibus sculpta, castanea, zona suturali, carina et regione umbilicali albidis; spira altitudine varians; anfr. 5½–6, convexiusculi, ultimus peripheria carinatus et basi prope umbilicum subangulatus, antice haud descendens; apertura diagonalis, securiformis; peristoma rectum, acutum, margine basali arcuato.

"Diam. maj. 13, min. 12, alt. 5–6, apert. long. 5. lat. 4 mill."

Hab. Nicobar Islands (*Stoliczka, Roepstorff*). Malaysia: Ceram, Buru, Amboina, Halmaheira.

12. **Trochomorpha pseudosanis**, *Fulton.*

Discus pseudosanis (Nevill), Godwin-Austen, P. Z. S. 1895, p. 442 (nom. nud.).
Trochomorpha (Videna) pseudosanis (Nevill), Fulton, A. M. N. H. ser. 6, xx, 1897, p. 213, pl. 6, fig. 5.

Original description:—"Shell openly umbilicate, dark brown, obliquely striated above and below; whorls 5½, slowly increasing, suture with a narrow well-defined margin, last whorl sharply keeled; aperture oblique; peristome scarcely thickened.

"Maj. diam. 13 millim., height 5 millim., width of umbilicus 4 millim."

Hab. Andaman Islands: Port Blair.

13. **Trochomorpha sanis**, *Benson.*

Helix sanis, Benson, A. M. N. H. ser. 3, vii, 1861, p. 84; Hanley & Theobald, Conch. Ind. 1872, pl. 83, figs. 4 & 7.
Trochomorpha sanis, Nevill, Hand List, i, 1878, p. 56.
Helix (Trochomorpha) sanis, Tryon, Man. Conch. ser. 2, iii, 1887, p. 84, pl. 16, figs. 3, 4.
Discus sanis, Godwin-Austen, P. Z. S. 1895, p. 442.

Original description:—"H. testa mediocriter umbilicata, conoidea-orbiculata, depressissima, lenticulari, oblique subarcuatim striatula, subgranulata, cornea; spira parum elevata, conoideo-depressa, apice obtuso, sutura impressiuscula, marginata; anfractibus 5½, subplanulatis, ultimo carina mediana acuta utrinque compressa munito, subtus convexiusculo; apertura obliqua, securiformi; peristomate recto, acuto; umbilico infundibuliformis.

"Diam. maj. 11, minor 10, axis 3½ mill."

Hab. Andaman Islands: Port Blair (*Nevill, Roepstorff*).

14. **Trochomorpha subnigritella**, *Beddome.*

Trochomorpha subnigritella, Beddome, P. Z. S. 1891, p. 314, pl. 29, figs. 4–6; Pilsbry, Man. Conch. ser. 2, viii, 1893, p. 127, pl. 43, figs. 44–46.
Discus subnigritella, Godwin-Austen, P. Z. S. 1895, p. 442.

Original description:—"Shell moderately umbilicate, depressedly turbinate, quite rounded at the apex; whorls 6, very gradually increasing, faintly striated, the last sharply angled at the periphery, nearly flat on the underside; aperture oblique, subquadrate; peristome simple, the margins distant; colour a rich dark brown, shining below.

"Diameter ½ inch [=12·75 mm.], height $\frac{5}{16}$ inch [=8 mm.]

"This species recalls the Pacific forms of the genus rather than the Indian ones, its nearest ally being *T. nigritella*, which, however, is a larger shell with the last whorl much broader."

Hab. Andaman Islands (*Hungerford*); South Andaman (*Godwin-Austen*).

15. **Trochomorpha sulcipes**, *Mörch.*

Nanina (*Videna*) *sulcipes*, Mörch, Journ. Conchyl. 1872, p. 309.
Discus sulcipes, Godwin-Austen, P. Z. S. 1895, p. 442.
Trochomorpha sulcipes, Nevill, Hand List, i, 1878, p. 57.

Original description:—"T. tenuis, unicolor fusca, perspective umbilicata, depressa, subdiscoidea, acute carinata; striæ incrementi expressæ præsertim superne; spiraliter obsolete lirata; spira vix elevata; sutura linearis, marginata; anfr. 5½ convexiusculi, ultimus descendens, basi convexiusculus; apertura reniformis, peristomate obliquo, margine supero incrassato, infero reflexo; labio recto, tuberculo (morbo ?) obsoletissimo.

"Diam. maj. 13 mill., min. 11; axis 5 mill."

Hab. Nicobar Islands (*Stoliczka*, *Roepstorff*); Nancowry (*Reinhardt*).

Var. **major**, *Mörch*, tom. cit. p. 309.

"T. major, tenuior, planior; peristoma tenue (nondum completum ?); anfr. ult. vix descendens, umbilico majore.

"Diam. maj. 15 mill., min. 12; axis fere 5 mill."

Hab. Great and Little Nicobar (*Reinhardt*).

"Animal solea pedis sulco mediano longitudinali postice cochleariformi excavata; notæum sulco profundo, peripherico postice carinato. Porus caudalis, ut mihi videtur, vix cornutus (ex specim. in spiritu conservato). T. fetæ anfr. primi tres brunnei serie macularum albarum."

T. sanis, Bens., differs in having the spire nearly plane, and in the growth-lines on the upper side being much stronger.

16. **Trochomorpha trilineata,** *Mörch.*

Nanina (Videna) sulcipes, var. *trilineata*, Mörch, Journ. Conchyl. 1876, p. 355.
Discus sulcipes, var. *trilineata*, Godwin-Austen, P. Z. S. 1895, p. 442.
Discus trilineatus, Godwin-Austen, Proc. Malac. Soc. London, i, 1895, p. 285, pl. 19, fig. 2 (anatomy).

This form was originally described as a variety of *T. sulcipes*, and a very short description of it was given by Mörch: "T. pallida, carina candida, utrinque linea brunnea." Lt.-Col. Godwin-Austen in P. Z. S. 1895, also considered it a varietal form only, but in Proc. Malac. Soc. London he raised it to specific rank, at the same time giving an account of its anatomy. There is a discrepancy as to *habitat*, for in the latter paper he mentions Great Nicobar, whereas in the former Camorta is indicated, which corresponds with the original locality given by Mörch.

Hab. Nicobar Islands: Camorta (*Roepstorff*).

Family ENDODONTIDÆ, *Pilsbry.*

Subfamily THYSANOTINÆ, *Godwin-Austen.*

Genus **THYSANOTA,** *Albers.*

Thysanota (as section of *Nanina*), Albers & Martens, Die Heliceen, ed. 2, 1860, p. 63; (as section of *Trochomorpha*) Pfeiffer, Malak. Blätt. xxiv, 1877, p. 7; (as section of *Eulota*) Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 207; Godwin-Austen, Moll. India, ii, 1907, p. 189.

Type, *Helix guerini*, Pfeiffer.

Range. Southern India and Ceylon.

Original description:—"Testa anguste umbilicata, trochiformis, tenuis; anfractus $7\frac{1}{2}$ vix convexiusculi, basi carinati, pilis rigidis ciliati, ultimus interne subplanatus, medio impressus; apertura angulato-lunaris; peristoma simplex, acutum, margine columellari brevissime expansiusculo."

Until the anatomy of *T. crinigera* was investigated by Lt.-Col. Godwin-Austen in 1907, and its relation to Endodontidæ established, the systematic position of the genus had remained uncertain. Von Martens placed it between *Rotula* and *Nigritella*, Pfeiffer classed it under *Trochomorpha*, while Prof. Pilsbry with some doubt considered it as having affinity with *Plectotropis*, and he therefore ranged it under *Eulota* as a section. *Thysanota*, *Philalanka*, and *Ruthvenia*, on conchological grounds alone, form a very natural group, as proposed by Godwin-Austen (subfamily Thysanotinæ), and one wonders how this idea has not occurred to anyone before.

17. **Thysanota tabida,** *Pfeiffer.*

Helix tabida, Pfeiffer, Malak. Blätt. ii, 1855, p. 106; ibid., Novit. Conch. ser. 1, i, 1855, p. 45, pl. 12, figs. 11, 12.

Trochomorpha tabida, Pfeiffer, Malak. Blätt. ii, 1855, p. 132.
Nanina (*Thysanota*) *tabida*, Nevill, Hand List, i, 1878, p. 54.
Ryssota tabida, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 53.
Trochomorpha (*Thysanota*) *tabida*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 94, pl. 19, figs. 97, 98.
Eulota (*Thysanota*) *tabida*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 208.

Original description:—"T. angustissime umbilicata, turbinata, solidula, conferte rugoso-striata, sub epidermide decidua, fuscula alba; spira convexo-conica, acutiuscula; anfr. 8 lentissime accrescentes, vix convexiusculi, ultimus non descendens, peripheria subangulatus, superne convexus, basi planiusculus; apertura vix obliqua, depressa, subangulato-lunaris; perist. simplex, rectum, margine basali versus insertionem leviter incrassato.

"Diam. maj. $17\frac{1}{2}$, min. 16, alt. 11 mill."

Hab. India: Nilgiris.

Pfeiffer recognized the affinity between the present species and *T. guerini*. It is, however, larger than the latter and not keeled, while the whorls are more tumid and the umbilicus is narrower; the aperture is also different, being rather semilunate, the columellar margin ascending more obliquely.

18. Thysanota guerini, *Pfeiffer*.

Helix guerini, Pfeiffer, Rev. Zool. 1842, p. 304; ibid., in Philippi, Abb. Beschr. Conchyl. i, 1843, p. 12, pl. 3, fig. 6; ibid., Conch. Cab., Heliceen, ii, 1853, p. 121, pl. 87, figs. 15, 16; Reeve, Conch. Icon. vii, 1852, pl. 85, fig. 457; Hanley & Theobald, Conch. Ind. 1870, pl. 55, fig. 1.
Nanina (*Thysanota*) *guerini*, Martens, Die Heliceen, ed. 2, 1860, p. 63; Nevill, Hand List, i, 1878, p. 54.
Trochomorpha guerini, Kobelt, Ill. Conch. Buch. 1879, pl. 68, fig. 11.
Trochomorpha (*Thysanota*) *guerini*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 82.
Helix (*Thysanota*) *guerini*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 93, pl. 18, figs. 95, 96.
Eulota (*Thysanota*) *guerini*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 208.
Thysanota guerini, Godwin-Austen, Moll. India, ii, 1907, p. 188.

Original description:—"T. umbilicata, trochiformis, epidermide fusca, rugosa induta; anfr. $7\frac{1}{2}$ vix convexiusculi, basi carinati; carina pilis confertis dense ciliata; basis convexiuscula; umbilicus angustissimus, pervius; apertura lata, lunaris; peristoma simplex, marginibus callo tenuissimo, nitido junctis.

"Diam. maj. 16, min. 15, alt. 10 mill."

Hab. India: Nilgiries (*Perrottet*, *Blanford*); Anamullays (*Beddome*).

In his original description, Pfeiffer gave the following dimensions: Diam. 22, alt. 13 mill. Subsequently (Mon. Helic. Viv. i, 1847, p. 118), the measurements quoted above were indicated without reference to the previous figures. I assume the later ones to be correct.

19. **Thysanota flavida**, *Gude.*

Thysanota flavida, Gude, Proc. Malac. Soc. London, xi, 1914, p. 52, text-figure.

Original description :—" Shell narrowly umbilicate, depressed trochiform, finely plicate-striate, pale yellowish-corneous. Spire subconvex, suture impressed, apex obtuse. Whorls $6\frac{1}{2}$, increasing slowly and regularly, convex above and below, carinated, the carina exserted, except in the protoconch, with a raised spiral thread a short distance above the carina and densely crowded with impressed spiral lines, more distinct on the under than on the upper side ; the carina and spiral thread fringed with deciduous coarse cuticular processes, resembling flattened hairs. Aperture oblique, securiform ; peristome acute, the outer margin subconvex, basal arcuate, columellar almost vertical, slightly dilated.

" Major diam. 12, minor 11·5 mm. ; alt. 7 mm."

Hab. India : Nilgiries (*Beddome*).

A specimen received from the late Col. Beddome as *T. crinigera*,

Fig. 1.—*Thysanota flavida.* (From Proc. Malac. Soc. London.)

proved upon examination to differ from that species in being more convex and more elevated in the spire, in the whorls being more convex, and in the narrow umbilicus ; the keel is also more exserted, while the plicate transverse striæ are much less pronounced, those in *crinigera* being almost lamellate. Mr. Ponsonby possesses two immature specimens which I also refer to the new species. They were likewise received from Col. Beddome as *crinigera* and, although labelled only South India, are probably from the same locality.

20. **Thysanota crinigera**, *Benson.*

Helix crinigera, Benson, A. M. N. H. ser. 2, v, 1850, p. 214 ; Reeve, Conch. Icon. vii, 1852, pl. 125, fig. 746 ; Hanley & Theobald, Conch. Ind. 1870, pl. 60, fig. 7.

Thysanota crinigera, Godwin-Austen, Moll. India, ii, 1907, p. 189, pl. 112, fig. 2 (anatomy).

Original description :—" T. anguste umbilicata, depresso-trochiformis, cornea, radiato-costulata ; apex obtusiusculus ; anfr. 6–$6\frac{1}{2}$ vix convexiusculi, linea unica elevata supersuturali minuti, ultimus carinatus ; carina suturaque pilis elongatis ciliatis ; basis planiuscula, ad umbilicum compressiuscula, lineis impressis concentricis frequentibus ornata ; apertura obliqua, angulato-lunaris, securiformis ; perist. simplex, acutum.

" Diam. maj. $12\frac{1}{2}$, min. 12, alt. $6\frac{1}{2}$ mill."

Hab. India: Nilgiries (*Jerdon*).

Nevill originally regarded *crinigera* as an immature form of *guerini* (Hand List, i, 1878, p. 54). According to Lt.-Col. Godwin-Austen (*l. c.* p. 190), he subsequently considered it distinct. In this he was, judging from the descriptions, quite justified. The shell of *T. crinigera*, besides being smaller, is more depressed, has more flattened whorls, and the raised spiral line above the periphery is a conspicuous feature which is lacking in *T. guerini.*

21. **Thysanota eumita**, *Sykes.*

Thysanota (?) *eumita*, Sykes, Proc. Malac. Soc. London, iii, 1898, p. 72, pl. 5, figs. 17, 18; Godwin-Austen, Moll. India, ii, 1907, p. 188.

Original description:—"Testa depresso-conica, anguste umbilicata, corneo-virescens, depresso-trochiformis, apice obtusulo; sutura impressa; anfr. 5–5½, plano-convexi, linea unica spiralis supersuturalis muniti, transversim subtiliter striata, ultimus carinatus, carina suturaque pilis elongatis ciliatis ornata, basi subinflatus; apertura angulato-lunaris; peristoma simplex, rectum.

"Diam. 4·2 mm.; alt. 2 mm."

Hab. Ceylon: Ambagamuwa; Badulla (*Collett*).

Is said to resemble a young *T. guerini*, but is more trochiform and not so convex.

22. **Thysanota hispida**, *Sykes.*

Thysanota hispida, Sykes, Proc. Malac. Soc. London, iii, 1898, p. 160, pl. 10, fig. 2; Godwin-Austen, Moll. India, ii, 1907, p. 188.

Original description:—"Testa trochiformis, periostraco fusco, rugoso, induta, basi impressa, umbilicus angustus, pervius; apex mediocris, applanatus; anfr. 6–6½, convexi, lira unica spiraliter sculpti, ultimus basi carinatus, lira carinaque pilis longis dense notatæ, apertura lata, lunaris; peristoma simplex, marginibus callo tenuissimo junctis.

"Diam. max. 8, alt. 5 mm."

Hab. Ceylon: Haputale (*Collett*).

Differs from *T. guerini* in shape and size; the single spiral thread is clothed with club-shaped hairs.

23. **Thysanota elegans**, *Preston.*

Thysanota elegans, Preston, Rec. Ind. Mus. iii, 1909, p. 135, pl. 22, fig. 19.

Original description:—"Shell trochiform, rimate, vitreous, yellowish white; whorls 6, the first two rounded, spirally striate, the remainder sculptured with fine spiral lines crossed by coarser, transverse, arcuate striæ and bearing a strong, peripheral, hairy liration, the last whorl sharply carinate at the base; base of shell

spirally striate only; sutures deeply impressed; umbilicus very narrow; peristome simple; aperture narrow sublunate.

"Diam. maj. 1·5 mm.; alt. 1·75 mm."

Hab. Ceylon: Uda Pussellawa.

Mr. Preston compares this species with *T. hispida*, Sykes, from which it differs by its much smaller size and more graceful form, while the spiral and arcuate transverse striæ, which characterize his shell, are lacking in the latter.

Genus **GLYPTAULAX** *, g. n.

Shell discoid, umbilicated, with close revolving liræ and sulcations, decussated by oblique costulæ. Anatomy unknown.

TYPE, *Helix artificiosa*, Benson.

Range. Burma.

23 *a*. Glyptaulax artificiosa, *Benson.*

Helix artificiosa, Benson, A. M. N. H. ser. 2, xviii, 1856, p. 249: Pfeiffer, Novit. Conch. ser. 1, i, 1860, p. 131, pl. 36, figs. 8–10; Hanley & Theobald, Conch. Ind. 1870, pl. 55, fig. 3.
Helix (*Patula* (*Punctum*)) *artificiosa*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 33, pl. 7, fig. 82.
Nanina artificiosa, Nevill, Hand List, i, 1878, p. 54.

Original description:—"Testa anguste umbilicata, orbiculata, discoidea, nitidiuscula, superne liris confertis sulcisque profundis spiralibus, costulisque confertis obliquis decussata, subtus liris remotioribus striisque radiatis ornata, pallide cornea; spira planulata (interdum omnino planata), apice vix elevato, obtuso; sutura profunda; anfractibus 6½ convexiusculi, lente accrescentes, ultimus superne subangulatus, subtus convexus; apertura vix obliqua, subanguste lunaris; peristomate acuto, leviter sinuato, margine dextro arcuato, crenulato, columellari brevissimo et basali substricto leviter reflexis.

"Diam. maj. 14, min. 12, alt. 5 mill."

Hab. Burma: Tenasserim (*Theobald*).

The species is unlike any other known to us and its systematic position is doubtful. The anatomy is unknown. It is placed provisionally in the subfamily Thysanotinæ between *Thysanota* and *Philalanka*.

Genus **PHILALANKA**, *Godwin-Austen.*

Philalanka, Godwin-Austen, Proc. Malac. Soc. London, iii, 1898, p. 11 (as subgenus of *Endodonta*); ibid., Moll. India, ii, 1907, p. 190.

Original description:—"Shell small, many-whorled, pyramidal or trochiform with a single liration, unicoloured. Jaw composed of numerous squarish plates. Basal plates of teeth of the radula

* γλυπτω curved, and αυλαξ furrow.

square or oblong; central teeth tricuspid, laterals multicuspid. No mucous gland at the extremity of the foot. Generative organs simple. No amatorial organ and no accessory organs."

TYPE, *P. secessa*, Godwin-Austen.

Range. South India and Ceylon; Islands off the West Coast of Sumatra.

In describing the type species, Lt.-Col. Godwin-Austen alludes to the interesting fact that this is the first record of the occurrence in India of this group of shells. He further states that "nothing like it has been found to the east of the Bay of Bengal, on the North-east frontier, or in Burma, but the possibility of its being a casual introduction is removed by the discovery of another allied species in the south of the Indian Peninsula by Colonel Beddome." Since the foregoing remarks were written two species have, however, been discovered in the Batu Islands off the West Coast of Sumatra. They were subsequently described and figured in the 'Mollusca of India,' part 10, where two other Cingalese species, previously referred to *Microcystis* and *Macrochlamys* respectively are included in *Philalanka*.

24. **Philalanka bilirata**, *Blanford*.

Helix bilirata, Blanford, J. A. S. B. xxx, 1861, p. 352, pl. i, fig. 7.
Nanina (Sitala) bilirata, Tryon, Man. Conch. ser. 2, ii, 1886, p. 56.
Sitala bilirata, Godwin-Austen, Moll. India, i, 1882, p. 40.

Original description :—" Testa perforata, globosa, turbinata, solidiuscula, cornea, transverse striata; spira conoidea, apice obtusula. Anfr. 7 angusti, sensim accrescentes; superiores carina una supramediana muniti, ultimus ad peripheriam acute bicarinatus, subtus tumidus. Apertura subverticalis, angulato lunaris, perist. rectum, marginibus distantibus, columellari brevi, verticali, reflexo.

" Diam. maj. 6, min. 5, axis $4\frac{1}{2}$ mm."

Hab. India: Shevroy and Kolamullie Hills.

Is stated to differ from *P. mononema*, Benson, in the rounded base and less elevated spire.

25. **Philalanka subbilirata**, *Godwin-Austen*.

Sitala subbilirata (Nevill MS.), Godwin-Austen, Moll. India, i, 1882, p. 39, pl. 10, fig. 11; var. fig. 12.
Nanina (Sitala) subbilirata, Tryon, Man. Conch. ser. 2, ii, 1886, p. 56, pl. 25, fig. 28.

Original description :—" Shell depressly conoid, rather openly perforate, covered with a strong epidermis; sculpture, very fine longitudinal ribbing, well seen on base, crossed by irregular lines of growth; colour dull ochraceous brown; spire flatly conoid, apex flat; whorls 5, with a fine rib on the periphery of the last whorl, with a single intermediate one above it, sides flat from the suture to this, slightly convex above; aperture ovate, subvertical;

peristome rather thickened; columellar margin slightly oblique, not reflected.

"Major diam. 2·7, alt. axis 1·3 mm."

Hab. Andaman Islands: Little Brother Island (*Nevill*); Batte Malve.

The shell shown in fig. 12 of plate 10 of Moll. India, from Batte Malve, was sent to Lt.-Col. Godwin-Austen by Nevill from the Indian Museum, Calcutta, as no. 206, *Sagdinella didrichsenii*, Mörch, with a note attached, "I doubt it being this species." He found that it agrees well with typical *subbilirata* from Little Brother, except that the shell was not so well grown, and the apex flatter.

26. **Philalanka ? liratula**, *Pfeiffer.*

Helix liratula, Pfeiffer, P. Z. S. 1860, p. 135; ibid., Malak. Blätt. vii, 1860, p. 234; Hanley & Theobald, Conch. Ind. 1875, pl. 150, figs. 5, 6.

Nanina (*Thalassia*) *liratula*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 47.

Charopa (*Thalassia*) *liratula*, Tryon, Man. Conch. ser. 2, ii, 1886, p. 215, pl. 63, figs. 74, 75.

Original description:—"T. umbilicata, trochiformis, tenuiscula, striata et liris filiformibus subconfertis cincta, diaphana, oleoso-micans, pallide corneo-lutescens; spira conica, apice obtusa; sutura impressa; anfr. 7½, convexiusculi, ultimus angulatus, non descendens, basi lævior, convexior; apertura vix obliqua, sub-angulato-lunaris; perist. simplex, rectum, margine columellari declivi, juxta umbilicum perangustum subdilatato.

"Diam. maj. 6, min. 5½, alt. 4 mill."

Hab. Ceylon (*Thwaites*).

Placed here provisionally with some doubt as to its systematic position.

27. **Philalanka homfrayi**, *Godwin-Austen.*

Sitala homfrayi, Godwin-Austen, P. Z. S. 1895, p. 448, fig. A.

Original description:—"Shell dextral, pyramidal, turreted, flat on base, imperforate; sculpture coarse transverse striation, with

Fig. 2.—*Philalanka homfrayi*, × 12. (From P. Z. S.)

two ribs on the periphery and fine spiral close ribbing on the apical whorls; colour horny grey; spire conic; apex blunt and papillate; suture shallow; whorls 4½, sides angulate, a strong raised rib on the periphery of the last whorl, and another similar

rib above it at the angulation of the whorl, above the vertical portion; aperture ovately quadrate, very oblique; peristome thin, slightly thickened; columellar margin vertical.

"Major diam. 1·4, alt. axis 1·4 mm."

Hab. Andaman Islands: South Andaman (*Roepstorff*).

Differs from *P. tricarinata* in the pyramidal form and smaller, narrower aperture.

28. **Philalanka tricarinata**, *Blanford.*

Helix tricarinata, Blanford, J. A. S. B. xxx, 1861, p. 355, pl. i, fig. 10; Hanley & Theobald, Conch. Ind. 1875, pl. 129, figs. 7, 10.
Sitala tricarinata, Godwin-Austen, Moll. India, i, 1882, p. 39, pl. 10, fig. 10.
Nanina (*Sitala*) *tricarinata*, Tryon, Man. Conch. ser. 2, ii, 1886, p. 55, pl. 25, fig. 25.

Original description:—"Testa aperte perforata, depresso turbinata, tenuis, pallide cornea, oblique striatula, subtus obsolete decussata, spira conoidea, apice planulata, perobtusa, sutura impressa. Anfr. 4 convexi, superne carinis duobus filiformibus cincti; ultimus tribus medianis circumdatus, non descendens, subtus rotundatus. Apertura subverticalis, rotundato-lunaris; peristoma rectum, acutum, marginibus distantibus, sinistro non reflexo.

"Diam. $1\frac{2}{3}$, alt. 1 mm."

Hab. India: Nilgiri Hills, Pykara (*Blanford*).

A very small form, readily distinguishable by the median revolving lira being at the periphery, one being below and the other above the periphery.

29. **Philalanka quinquelirata**, *Gude.*

Philalanka quinquelirata, Gude, Proc. Malac. Soc. London, xi, 1914, p 51, text-figure.

Original description.—"Shell dextral, pyramidal, narrowly perforate, pale yellowish corneous, semi-translucent, covered with a

Fig. 3.—*Philalanka quinquelirata.* (From Proc. Malac. Soc. London.)

deciduous cuticle; finely and closely striated, the striæ being flexuous on the base, where there are also traces of excessively minute spirals. Spire convex, apex obtuse, suture deep. Whorls 6, tumid above, inflated below, increasing slowly and regularly, with five fine spiral liræ, one at the periphery, the other four between it and the suture; the last whorl not descending in

front. Aperture nearly vertical, semilunate; peristome thin, the lower margin slightly, the columellar margin strongly reflected and partly overhanging the narrow perforation." (*Gude.*)

Diam. 5·25, alt. 4·25 mm.

Hab. India: Anamullay Hills (*Beddome*).

Five specimens—labelled *tricarinata*, Blanford—received by Mr. Ponsonby from the late Col. Beddome, proved upon examination to be quite distinct, and to differ, in fact, from all other known forms. My own collection contains two specimens from the same source.

Philalanka quinquelirata is much larger than *P. tricarinata* which measures less than 2 mm. and possesses, moreover, only three revolving liræ, the lowest of which is below the periphery, whereas in the present species it is peripheral. The perforation of *P. tricarinata* is proportionately wider and the columellar margin is not reflected, while the aperture is higher in proportion to its width than is the case in *P. quinquelirata.*

30. **Philalanka ? lamcabensis,** *Jousseaume.*

Plectopylis lamcabensis, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 278, pl. 4, fig. 8.
Plectopylis ? lamcabensis, Gude, Science Gossip, N. S. v, 1898, p. 171, fig. 91 (copied from Jousseaume).

"Shell subperforate, trochiform, stout, somewhat thin, striated and surrounded on the last whorl by three thread-like ridges,

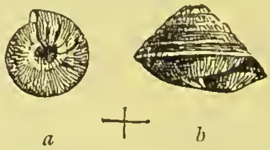

Fig. 4.—*Philalanka ? lamcabensis* (after Jousseaume).

diaphanous, shining, corneous white, apex obtuse, suture impressed, crenulate; whorls 7½, flattened, the last angulate, not descending; base more convex, radiately striate; aperture scarcely oblique, subangulate, lunate; peristome simple, straight, columellar margin sloping, near the umbilicus narrowly dilated.

"Diam. 4, alt. 3 mill."

Hab. Ceylon: Nuwara Eliya (*Simon*).

Described as a species of *Plectopylis*, the absence of any mention of internal folds or denticles makes the generic reference extremely questionable. Mr. Sykes doubtfully suggests (Proc. Malac. Soc. London, iii, 1898, p. 71) that it belongs to the genus *Sitala*; this I consider improbable. The aspect of the shell, especially the excavated umbilical region, would rather suggest the genus *Philalanka*.

31. **Philalanka secessa**, *Godwin-Austen.*

Philalanka secessa, Godwin-Austen, Proc. Malac. Soc. London, iii, 1898, p. 11, pl. 1, fig. 1 (shell), fig. 2 (animal), figs. 3–5 (anatomy); ibid., Moll. India, ii, 1907, p. 191.

Original description:—"Shell pyramidal, base convex, narrowly umbilicated. Sculpture: fine, irregular, costulate transverse lines; a single lirate band follows the angulation of the whorl throughout, with another on and above the suture; on the underside an exceedingly fine striation may be seen under a high power (× 60). Colour pale ochraceous, with a greenish tinge. Spire conic, sides nearly flat; apex blunt. Suture shallow, with a thread-like liration. Whorls 8, narrow, sides very slightly convex below the liration, flat from that to the suture. Aperture semilunate, narrow, vertical. Peristome thin, slightly reflected on the columellar side, which is suboblique.

"Maj. diam. 7, alt. axis 6 mm." (*Godwin-Austen.*)

Hab. Ceylon: Ambegamua (*Collett*).

32. **Philalanka daghoba**, *Blanford.*

Helix daghoba, Blanford, J. A. S. B. xxx, 1861, p. 356, pl. 2, fig. 2; Hanley & Theobald, Conch. Ind. 1875, pl. 150, fig. 10.

Patula (*Actinaria*) *daghoba*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 99.

Helix (*Patula* (*Actinaria*)) *daghoba*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 69, pl. 13, fig. 60.

Sesara daghoba, Gude, Journ. Malac. vii, 1900, p. 142.

Original description:—"Testa anguste perforata, depresse conoidea, oblique striata spiraliter sulcata, carinata, suturæ impressæ. Anfr. 7–8 lente accrescentes subconvexi, ultimus non descendens, valde carinatus, infra convexus, lævis, ad umbilicum vix impressus. Apertura subrecta, depressa securiformis. Peristoma acutum ad umbilicum reflexum, intus 2 dentibus palatalibus munitum.

"Diam. maj. 6, min. 5·3, alt. 3 mm.; apert. alt. 1·6 mm." (*Blanford.*)

Hab. South India: Patchamullay and Kalryenmullay Hills (*Foote*).

The shell is stated by Blanford to be nearly allied to *H. retifera*, Pfr., but to be distinguished from that species by its minute umbilicus and by the form, number, and position of the internal teeth, which in *H. daghoba* are small and compressed, but not lamelliform, and are situated very near the edge of the peristome. The absence of parietal lamellæ, however, indicates that the affinity of the present species must be looked for among such forms as *secessa*, G.-A., and *bilirata*, Blanf., rather than *retifera*, Pfr. The position of the teeth near the peristome induced the present writer in 1900 to include the species in *Sesara*, but the late W. T. Blanford, in a letter dated Sept. 23rd, 1900, pointed out that *daghoba*, together with *pirrieana* and *bidenticulata*, might belong to *Philalanka*, and as Lt.-Col. Godwin-Austen is of the same opinion as regards *daghoba*, I have included it here.

Unfortunately I have been unable to find Blanford's type-specimen and the shells I have seen, purporting to represent the species, have the palatal teeth much further back, so that I entertain doubts as to their identity.

33. **Philalanka pirrieana**, *Pfeiffer.*

Helix pirrieana, Pfeiffer, P. Z. S. 1854, p. 55; Reeve, Conch. Icon. vii, 1854, pl. 191, fig. 1341; Hanley & Theobald, Conch. Ind. 1870, pl. 87, figs. 5, 6.
Helix (*Actinaria*) *pirrieana*, Pfeiffer, Malak. Blätt. ii, 1856, p. 128.
Helix (*Laoma*) *pirrieana*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 68, pl. 13, fig. 58.
Sesara pirrieana, Gude, Journ. Malac. vii, 1900, p. 142.

Original description:—"T. perforata, globoso-conica, tenuis, lævigata (sub lente vix striatula), pellucida, cornea; spira convexo-conica, acutiuscula; sutura impressa, marginata; anfr. 7–8 convexiusculi, angustissimi, ultimus carinatus, non descendens, basi convexus, intus ter bidenticulatus: denticulis subæqualibus, extus pellucentibus; apertura vix obliqua, depressa, angulato-lunaris, denticulorum pare antico coarctata; perist. simplex, rectum, margine columellari ad perforationem apertam dilatato, reflexo.

"Diam. maj. 5, min. $4\frac{1}{2}$, alt. 4 mill." (*Pfeiffer.*)

Hab. India: Walaghat, Koondah Mts., near Calicut (*Pirrie*).

An examination of the type has convinced me that the late W. T. Blanford was perfectly justified in his surmise, as recorded under *P. daghoba*, that this species should be also referred to *Philalanka.*

34. **Philalanka bidenticulata**, *Benson.*

Helix bidenticulata, Benson, A. M. N. H. ser. 2, ix, 1852, p. 405; Reeve, Conch. Icon. vii, 1853, pl. 174, fig. 1184; Hanley & Theobald, Conch. Ind. 1870, pl. 60, fig. 6.
Helix (*Actinaria*) *bidenticulata*, Pfeiffer, Malak. Blätt. ii, 1856, p. 128.
Helix (*Laoma*) *bidenticulata*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 69, pl. 13, fig. 59.
Sesara bidenticulata, Gude, Journ. Malac. vii, 1900, p. 142.

Original description:—"Testa perforata, depresso-conica, obsolete radiato-striata, albida (decorticata); spira subconica, apice obtuso, sutura impressa: anfractibus 6, arcte convoluti, convexis, omnibus superne lineis duabus æquidistantibus, elevatiusculis instructi, ultimo carinato, subtus convexo; apertura arcte securiformi, verticali; peristomatis margine superiori brevissimo, columellari oblique descendente, expanso, superne reflexo, basali arcuato, dentibus duobus minutis distantibus, submarginalibus, dextro prominentiore, munito; perforatione pervia.

"Diam. maj. 3, min. $2\frac{2}{3}$, axis $2\frac{1}{2}$ mill." (*Benson.*)

Hab. India: Nilgiris (*Jerdon*).

Cf. remarks under *P. daghoba*, *ante* p. 19.

35. Philalanka trifilosa, *Pfeiffer*.

Helix trifilosa, Pfeiffer, P. Z. S. 1853, p. 125.
Helix (*Trochomorpha*) *trifilosa*, Pfeiffer, Malak. Blätt. ii, 1856, p. 132.

Original description:—"T. perforata, depresse trochiformis, tenuis, radiato-striata, acute carinata, vix nitidula, pallide cerea; spira conoidea, apice hyalina obtusula; sutura marginata; anfr. $6\frac{1}{2}$, convexiusculi, arcte convoluti, superne carinis 3 filiformibus muniti, ultimus non descendens, basi convexior, nitidus; apertura verticalis, depressa, angulato-lunaris; perist. rectum, acutum, marginibus remotis, supero brevissimo, basali leviter arcuato, columellari declivi, superne dilatato, reflexo.

"Diam. maj. $5\frac{3}{8}$, min. 5, alt. $3\frac{1}{2}$ mill."

Hab. Ceylon (*Thwaites*).

This species, described from the Cuming Collection, has never been figured. Unfortunately, in spite of a diligent search for the type, Mr. E. A. Smith, until lately Assistant-Keeper of Zoology at the Natural History Museum, has failed to trace its whereabouts.

36. Philalanka ? mononema, *Benson*.

Helix mononema, Benson, A. M. N. H. ser. 2, xii, 1853, p. 92; Reeve, Conch. Icon. vii, 1854, pl. 191, fig. 1339; Hanley & Theobald, Conch. Ind. 1874, pl. 87, figs. 2 & 3.
Helix (*Trochomorpha*) *mononema*, Pfeiffer, Malak. Blätt. ii, 1856, p. 132.
Nanina (*Microcystis*) *mononema*, Nevill, Hand List, i, 1878, p. 41.
Sitala mononema, Godwin-Austen, Moll. India, i, 1882, p. 41, pl. 9, fig. 6; Tryon, Man. Conch. ser. 2, ii, 1886, p. 57 (*monomena*, err. typ.), pl. 25, fig. 33.
Philalanka ? mononema, Godwin-Austen, Proc. Malac. Soc. London, iii, 1898, p. 12.

Original description: — "T. angustissime perforata, trochiformis, radiato-striatula, corneo-albida, parum nitida, translucens; spira conica, apice acutiusculo; sutura distincta; anfr. $6\frac{1}{2}$–7 subæquales, superne convexiusculi, filo unico elevato, tenui, mediano cincti, ultimus acute filoso-carinatus, subtus subplanulatus; apertura verticalis, depresse securiformis; perist. rectum, acutum, marginibus distantibus, columellari brevi, verticali, reflexo, perforationem subtegente.

"Diam. maj. 5, min. $4\frac{1}{2}$, alt. $4\frac{1}{2}$ mill." (*Benson*.)

Hab. Ceylon: Heneratgodde (*Layard*); Balapiti (*Nevill*).

Resembles *P. secessa* in shape, but is somewhat smaller and with a more convex spire. The figure given of the species by Godwin-Austen differs considerably from that of Reeve, but is more like the one in Conch. Ind.

37. **Philalanka bolampattiensis**, *Godwin-Austen.*

Philalanka bolampattiensis, Godwin-Austen, Proc. Malac. Soc. London, iii, 1898, p. 13, pl. 1, fig. 6.

Original description:—"Shell depressedly conoid, rounded and widely umbilicated below, keeled. Sculpture: a single liration is situated about one-third the breadth of the whorl on the upper side, following the sutural thread, which commences on the keel; fine vertical irregular lines of growth. Colour pale horny. Spire depressedly pyramidal, sides flattened, apex flatly rounded. Suture well marked. Whorls 6, convex below the liration, flat above it. Aperture narrow, semilunate. Peristome somewhat thickened, columellar margin reflected and very oblique.

"Maj. diam. 5, alt. axis 2·6 mm." (*Godwin-Austen.*)

Hab. India: Bolampatti Hills (*Beddome*).

While possessing the principal characteristics of the type species from Ceylon it has a more depressed form, agreeing in this respect with the other Cingalese species subsequently referred to the genus.

38. **Philalanka febrilis**, *Blanford.*

Helix febrilis, Blanford, J. A. S. B. xxx, 1861, p. 357, pl. 2, fig. 4; Hanley & Theobald, Conch. Ind. 1875, pl. 129, fig. 4.
Sitala febrilis, Godwin-Austen, Moll. India, i, 1882, p. 38.
Nanina (*Sitala*) *febrilis*, Tryon, Man. Conch. ser. 2, ii, 1886, p. 55, pl. 25, fig. 24.

Original description:—"Testa angustissime perforata, globoso-turbinata, spiraliter lirata. Spira subelevata, convexa, apice obtusa. Suturis valde impressis. Anfr. 4½ convexi; ultimus non descendens, ad peripheriam subdepressus infra planate rotundatus, lævis. Apertura obliqua, oblonga. Peristoma rectum, acutum, ad basin expansiusculum, marginibus remotis, columellari breviter reflexo.

"Diam. maj. 1·5, min. 1·3, alt. 1·25 mm.; apert. alt. 0·6 mm." (*Blanford.*)

Hab. India: Kalryenmullay Hills (*Foote*).

This species is stated to bear a general resemblance to *tricarinata*, but to be readily distinguishable by its higher spire, the absence of the characteristic triple carination, and the flatness of its basal surface.

39. **Philalanka tertiana**, *Blanford.*

Helix tertiana, Blanford, J. A. S. B. xxx, 1861, p. 355, pl. 1, fig. 11; Hanley & Theobald, Conch. Ind. 1870, pl. 16, fig. 10.
Sitala ? tertiana, Godwin-Austen, Moll. India, i, 1882, p. 40, pl. 9, fig. 9.
Nanina (*Sitala*) *tertiana*, Tryon, Man. Conch. ser. 2, ii, 1886, p. 56, pl. 25, fig. 29.

Original description:—"Testa perforata, depresse turbinata,

tenuis, pallide cornea, striatula; spira conoidea, apice obtusa, sutura impressa. Anfr. 6 angusti, convexi, ultimus haud descendens, subtus rotundatus. Apertura subverticalis, rotundato lunaris; peristoma simplex, marginibus distantibus, columellari reflexiusculo.

"Diam. maj. $2\frac{1}{2}$, min. $2\frac{1}{4}$, alt. $1\frac{3}{4}$ mm." (*Blanford.*)

Hab. India: Nilgiri Hills, Pykara and Neddiwuttom.

40. **Philalanka thwaitesi**, *Pfeiffer.*

Helix thwaitesi, Pfeiffer, P. Z. S. 1853, p. 125; Reeve, Conch. Icon. vii, 1854, pl. 191, fig. 1336; Hanley & Theobald, Conch. Ind. 1875, pl. 128, figs. 7–10.

Helix (Microcystis) thwaitesi, Pfeiffer, Malak. Blätt. ii, 1856, p. 123.

Nanina (Microcystis) thwaitesi, Tryon, Man. Conch. ser. 2, ii, 1886, p. 118, pl. 39, fig. 5.

Microcystis nuwara, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 273.

Philalanka thwaitesi, Godwin-Austen, Moll. India, ii, 1907, p. 193, pl. 112, fig. 1 (jaw & radula).

Original description:—"T. aperte perforata, convexo-depressa, striatula nitida, cereo-hyalina; spira breviter conoidea, obtusula; sutura profunda, submarginata; anfr. $6\frac{1}{2}$ convexi, arcte convoluti, ultimus non descendens, basi inflatus; apertura verticalis, lunaris; perist. rectum, acutum, margine columellari arcuatim oblique descendente, ad perforationem vix dilatato.

"Diam. maj. 5, min. $4\frac{1}{3}$, alt. 3 mill." (*Pfeiffer.*)

Hab. Ceylon (*Thwaites*); Nuwara-Eliya (*Simon*); Ambagamuwa (*Collett*).

Under a strong lens the shell is seen to be densely covered with spiral striæ. Mr. E. R. Sykes established the fact (Proc. Malac. Soc. London, iii, 1898, p. 65) that *Microcystis nuwara*, Jousseaume, and the present species are identical. Jousseaume, in fact, based his species upon the figure of *thwaitesi* in Conch. Icon., which was drawn from Pfeiffer's type.

Lt.-Col. Godwin-Austen investigated the anatomy and describes the genitalia, but he gives no figures.

Var. **suavis**, *Jousseaume.*

Microcystis suavis, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 273, pl. 4, fig. 3; Collett, J. A. S. B. Ceylon Branch, xv, 1897 (1898), p. 12.

Microcystis thwaitesi, var. *suavis*, Sykes, Proc. Malac. Soc. London, iii, 1898, p. 65.

Differs from the typical form in having a slightly more depressed spire, a somewhat larger umbilicus, and in the mouth being somewhat different in shape.

Hab. Ceylon: Nuwara Eliya (*Simon*); Ambagamuwa (*Collett*).

41. **Philalanka depressa**, *Preston.*

Microcystis thwaitesi, var. *depressa*, Preston, Rec. Ind. Mus. iii, 1909, p. 135, pl. 22, fig. 6.

Shell depressed-conoid, almost lenticular, pale corneous, translucent, shining, very finely striated and with excessively minute spirals; spire much depressed, suture deep. Whorls 4½, strongly convex, closely wound. Aperture vertical, reniform; peristome acute, upper margin ascending at first, outer and basal evenly arcuate, columellar slightly dilated, vertical.

Diam. 3·5, alt. 2 mm.

Hab. Ceylon: Uda Pussellawa (*Preston*).

Mr. Preston considers this form a variety of *thwaitesi*, stating that, except in the depressed spire, it appears to be normal. The figure certainly bears out this view, but it must have been very badly drawn. A specimen, received by me from the author, differs from *thwaitesi* in several important respects, and the foregoing description has been drawn up from it. The shell is much more depressed, being almost lenticular; the whorls are much more convex above, the umbilicus is much wider, distinctly showing all the whorls; on the other hand, the region round the umbilicus is not excavated as in *thwaitesi*, and the mouth is also different, being reniform, not lunate. The whole shell has, in fact, a totally different aspect, and I have no hesitation in according it specific rank.

42. **Philalanka circumsculpta**, *Sykes.*

Microcystis thwaitesi (non Pfeiffer), Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 272.
Macrochlamys ? circumsculpta, Sykes, Proc. Malac. Soc. London, ii, 1897, p. 235, pl. 16, figs. 3 & 4; op. cit. iii, 1898, p. 65.
Philalanka circumsculpta, Godwin-Austen, Moll. Ind. ii, 1907, p. 194.

Original description :—"Testa perforata, convexo-depressa, nitida, cereo-hyalina; spira breviter conoidea, apice obtusa; sutura impressa; anfr. 5, convexi, arte convoluti, obsolete spiraliter lirati, ultimus non descendens, basi inflatus; apertura lunaris; peristoma rectum, acutum, margine columellari ad perforationem dilatato, subreflexo.

"Diam. max. 5, min. 4·7 mm.; alt. 3 mm." (*Sykes.*)

Hab. Ceylon: Watawala (*Collett*); Nuwara-Eliya (*Simon*).

"This species is nearly related to the *Helix thwaitesi* of Pfeiffer (which is also obsoletely spirally lirate), but may be at once distinguished by the fact that its breadth is greater in proportion to the number of whorls. The umbilicus is also slightly smaller in the present species, the spire is not so much raised in proportion, and the nucleus is larger. The sculpture is stronger than in *H. thwaitesi*, and a few of the stronger lines of growth intersect the revolving liræ, thus giving the shell a decussated appearance under a lens."

Lt.-Col. Godwin-Austen examined the animal of a specimen received from Mr. Collett. He discovered two embryonic shells inside it, thus establishing the fact that the species is ovo-viviparous, a feature which it probably shares with other species of the genus.

43. **Philalanka? sinhila,** *Godwin-Austen.*

Lamprocystis ? sinhila, Godwin-Austen, Proc. Malac. Soc. London, ii, 1897, p. 178, pl. 14, fig. 2.

Original description:—"Shell globose, solid for its size, scarcely umbilicated; sculpture smooth, with a strong periostracum; colour ? (bleached). Spire low, depressedly conic, apex very blunt; suture shallow; whorls 5, closely wound, regularly increasing. Aperture narrowly lunate, vertical; peristome simple; columellar margin suboblique.

"Maj. diam. 3·6; alt. axis 1 mm." (*Godwin-Austen.*)

Hab. Ceylon: Uda Pussellawa, Watawala (*Preston*).

A specimen received from Mr. Preston enables me to supplement the foregoing description in one respect, namely, as regards colour, which is pale corneous. It also shows distinct microscopic spirals, and agrees therefore with the other members of this group, a fact which induces me to include it here.

Genus **RUTHVENIA**, *Gude.*

Austenia, Gude, Science Gossip, N. S. iii. 1897, p. 390, not *Austenia*, Nevill (1878).
Sykesia, Gude, tom. cit. p. 332; ibid. vi, 1899, p. 149, not *Sykesia*, Pomel (1883); Godwin-Austen, Moll. India, ii, 1907, p. 196.
Ruthvenia, Gude, Proc. Malac. Soc. London, ix, 1911, p. 271.

Dextral, shell translucent, with straight acute edges, acutely keeled, with one or more fringed spiral liræ. Parietal and palatal armature present.

TYPE, *Helix clathratula*, Pfeiffer.

Range. Southern India and Ceylon.

Key to the Species.

A. One transverse parietal plate.
  a. Notched about the middle, a short support posteriorly above. Habitat, Ceylon.
    α. Umbilicus wide, ribs and liræ prominent .... *clathratula.*
    β. Umbilicus narrower, ribs and liræ obsolete .. v. *compressa.*
  b. Not notched.
    α. Straight, without support, umbilicus still narrower. Habitat, India .... *clathratuloides.*
    β. Sinuous, with a short support anteriorly above; umbilicus still narrower. Habitat, India .. *retifera.*

B. Two transverse parietal plates.
  a. Shell flattened, no fold below umbilical angulation, umbilicus still narrower. Habitat, Ceylon. *caliginosa.*
  b. Shell conoid, with a double fringe of curved hairs; a horizontal fold below umbilical angulation; umbilicus still narrower. Narrowest of all. Habitat, Ceylon .... *biciliata.*

44. **Ruthvenia retifera**, *Pfeiffer.*

Helix retifera, Pfeiffer, P. Z. S. 1845, p. 73; Reeve, Conch. Icon. vii, 1853, pl. 173, fig. 1170; Hanley & Theobald, Conch. Ind. 1874, pl. 87, figs. 8 & 9.
Helix (Plectopylis ?) retifera, Nevill, Hand List. i, 1878, p. 70.
Helix (Plectopylis) retifera, Tryon, Man. Conch. ser. 2, iii, 1887, p. 161, pl. 34, figs. 63, 64.
Plectopylis retifera, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146; Gude, Science Gossip, N. S. iii, 1897, p. 301, fig. 43 (shell and armature).
Plectopylis (Sykesia) retifera, Gude, Science Gossip, N. S. vi, 1899. p. 149.

Original description:—"T. umbilicata, obtuse trochiformis, striato-plicatula, lineis nonnullis concentricis elevatis reticulata, carinata, diaphana, sericina, pallide cornea; spira elevata, obtusa; anfr. 6½ planiusculi, ultimus basi subplanus, striatus; umbilicus mediocris, pervius; apertura depressa, securiformis; perist. simplex, acutum, margine supero brevi, basali plane arcuato.

"Diam. maj. 7, min. 6¾, alt. 4 mill." (*Pfeiffer.*)

Hab. India: Nilgiris (*Metcalf, Jerdon*); Koonoor Ghat (*Blanford, Nevill*); Tinnevelly Hills (*Beddome*); Shevroy Hills (*Blanford*); Mysore (*Parry*).

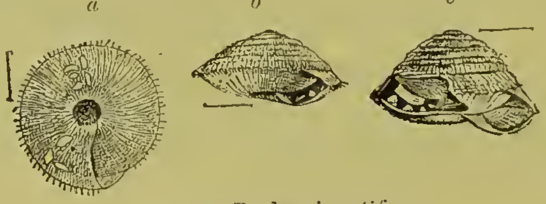

Fig. 5.—*Ruthvenia retifera.*

The parietal armature consists of a single, strong, vertical plate, slightly sinuate, but not notched, giving off a slight support anteriorly a little below the upper extremity (see fig. 5 *c*, which shows both the parietal and palatal armatures from the posterior side). The palatal armature—as in all the members of the group—is distinctly visible through the shell-wall, and consists of two series of denticles, the upper series being composed of: posteriorly, a strong, short, vertical flattened tooth, and, anteriorly, a minute, horizontally elongated denticle, in a line with the base of the posterior tooth; the lower series is composed of: posteriorly, a smaller, flattened, vertical tooth, and

anteriorly, in a line with its upper extremity, a minute, horizontally elongated denticle, and, in a line with its base, a larger denticle, elongated obliquely. Above the periphery occurs, in addition, a small, horizontal denticle, and below the umbilical angulation a short horizontal fold. The two specimens figured are in Mr. Ponsonby's collection. That shown in fig. 5 *b* is not quite mature, the newly-formed palatal armature consisting of only one horizontal and two vertical denticles. The late Col. Beddome's collection contains a large series of this species from the Tinnevelly Hills; of these, nine full-grown specimens possess only one set of denticles; five not quite full-grown specimens are each provided with two sets of denticles, the older being complete, while the newly-formed sets consist of one, two, or three denticles; four immature specimens have only one set of denticles; ten other immature shells possess each two sets of denticles. Of the latter, three have the older set complete and the newer set partly formed, five have the older set incomplete (partly absorbed) and the new set complete; while, finally, the two remaining specimens have both sets complete. It may, therefore, be safely inferred that the older set does not become absorbed until the new set is completed. In a few instances I have observed that the two lower anterior denticles have become fused.

45. **Ruthvenia clathratuloides**, *Gude.*

Plectopylis clathratuloides, Gude, Science Gossip, N. S. iii, 1897, p. 332, fig. 44.
Plectopylis (Sykesia) clathratuloides, Gude, op. cit. vi, 1899, p. 149.
Sykesia clathratuloides, Godwin-Austen, Moll. India, ii, 1907, p. 199.

Original description:—" Shell depressed conical, moderately umbilicated, pale corneous, translucent, finely and regularly plicated by raised ribs above, finely and closely ribbed and a little shining below; whorls $5\frac{1}{2}$ slowly increasing, slightly convex, suture impressed. Periphery with an acute compressed keel, above which revolve two raised spiral ridges, the lower provided with a fringe of coarse hairs. Aperture subquadrate; peristome simple, a little thickened. Umbilicus deep and moderately wide. Parietal armature, one strong, vertical, simple plate. Palatal armature in two series; upper series with one posterior, vertical, conical tooth and one minute anterior denticle; lower series, with one posterior, vertical tooth and a small anterior denticle; in addition, one elongated horizontal fold below the umbilical angulation and a small fold above the peripheral angulation.

" Diam. maj. 6, min. 5·5.; alt. 3·5 mm." (*Gude.*)

Hab. India: Anamullay Hills; Madura (*Beddome*).

The present species differs from *R. clathratula* in being more elevated, in having a narrower umbilicus, and in being less shining and more tumid below, while from *R. retifera* it differs in the less elevated spire and the wider umbilicus; it is, in fact, intermediate

between these two species. The parietal armature consists of a simple, strong, vertical plate, which is not notched, and is without supports (see fig. 6 *d*). The palatal armature is in two series, the first (upper) series consisting of a posterior vertical

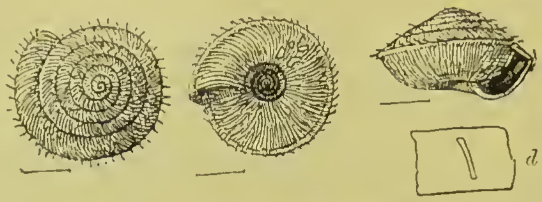

Fig. 6.—*Ruthvenia clathratuloides.*

tooth and a minute anterior denticle; the second (lower) series being composed of a posterior vertical tooth and a small anterior denticle; below the umbilical angulation there is, besides, an elongated horizontal fold, and above the peripheral angulation a small fold (see fig. 6 *b*, which shows the base of the shell with the palatal armature visible through the shell-wall). The specimen figured is one of the Anamullay Hills specimens in the late Colonel Beddome's collection. Six specimens from Madura, India, also in that collection, I refer to this new form; four of these are immature and exhibit two sets of armatures, as is the case in immature specimens of *R. retifera.*

When describing this species in 1897, I hazarded the opinion that the specimens referred to under *Plectopylis clathratula* by Nevill (Hand List, i, 1878, p. 70) as having been collected in Sikkim by Stoliczka might pertain to my species. Lt.-Col. Godwin-Austen, however, rejects this surmise and thinks that there has been some mixing of specimens. He states that he has never seen the species in undoubted Darjeeling collections, such as Blanford's and his own. I am quite prepared to admit the force of this argument, and it is, in fact, extremely improbable that a species should occur in two localities so widely separated and so different faunistically as Sikkim and the southern part of the Indian Peninsula or Ceylon.

46. **Ruthvenia clathratula,** *Pfeiffer.*

Helix clathratula, Pfeiffer, Zeits. Malak. vii, 1850, p. 67; Reeve, Conch. Icon. vii, 1852, pl. 65, fig. 336; Pfeiffer, Conch. Cab. Heliceen, iii, 1853, p. 310, pl. 127, figs. 17–20; Hanley & Theobald Conch. Ind. 1875, pl. 132, figs. 1-4.

Helix (Plectopylis) clathratula, Nevill, Hand List, i, 1878, p. 70; Tryon, Man. Conch. ser. 2, iii, 1887, p. 161, pl. 34, figs. 72, 73.

Plectopylis clathratula, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 277.

Plectopylis (Austenia) clathratula, Gude, Science Gossip, N. S. iii. 1897, p. 300, fig. 42 (shell and armature).

Plectopylis (Sykesia) clathratula, Gude, op. cit. vi, 1899, p. 149.
Helix puteolus, Benson, A. M. N. H. ser. 2, xii, 1853, p. 92; Reeve, Conch. Icon. vii, 1854, pl. 190, fig. 1334.

Original description:—"T. late umbilicata, lenticularis, acute carinata, superne liris elevatis (in quovis anfractu 2) et costis distinctis clathrata, parum nitens, cornea; spira parum elevata, obtusiuscula; anfract. 5 subæquales, vix convexiusculi, ultimus basi radiato-striatus, circa umbilicum subinflatus; apertura verticalis, angusta, angulato-lunaris; perist. simplex, rectum, acutum.

"Diam. maj. $5\frac{1}{2}$, min. 5, alt. $2\frac{3}{4}$ mill." (*Pfeiffer.*)

Hab. Ceylon: Kandy, Balapiti, Badulla (*Blanford*, *Layard*, *Nevill*); Ambagamuwa (*Collett*); Balcadua (*Simon*).

When first described by Pfeiffer the habitat was unknown.

Benson, in 1853, described what he thought was a new species under the name of *Helix puteolus*, from Balcadua, Ceylon. Pfeiffer recorded this name as a synonym of his species (Mon. Helic. Viv. iv, 1859, p. 116) and Benson himself subsequently pointed out the identity of the two (A. M. N. H. ser. 3, v, 1860, p. 247).

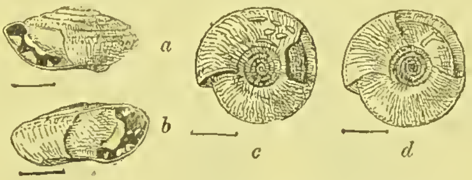

Fig. 7.—*Ruthvenia clathratula.*

The parietal armature consists of a single, slightly oblique, vertical plate, which is slightly twisted and a little notched in the middle, and gives off posteriorly above an obliquely ascending support (see fig. 7 *d*, which shows the shell with part of the outer wall removed). The palatal armature appears to be somewhat variable, and consists of various denticles, arranged principally in two horizontal series, midway between the periphery and the umbilicus. In the specimen figured, which is in Mr. Ponsonby's collection, the first series consists of: posteriorly, a short, strong, flattened vertical tooth, and anteriorly, two short, slight, horizontal denticles, separated by a short space; the second series consists of: posteriorly, a short, flattened, vertical tooth, a little smaller than the one above it, and, anteriorly, a short, oblique, curved denticle. Below these two series is a longer, but thin, horizontal fold, coincident with the umbilical angulation, while above the vertical tooth of the first series is a minute, horizontal denticle, coincident with the peripheral keel. The specimen measures 5 millimetres in diameter. (Fig. 7 *a* shows both armatures from the posterior side, the anterior palatal denticles being hidden by the posterior teeth; fig. 7 *b* gives the anterior view of both armatures, but the posterior tooth of the first series is here hidden by the parietal plate; fig. 7 *c* shows

the palatal folds as they appear from below the shell-wall; all the figures are enlarged.) Two specimens in my collection—measuring, major diameter 6 millimetres, minor diameter 5·5, axis 3 millimetres—have the anterior portion of the first series consisting of four horizontal denticles, the first two close together, the third a little smaller and further distant, and the fourth still smaller and still further distant; the anterior portion of the second series possesses, in addition to the oblique curved denticle, a slight, straight, horizontal denticle. Another specimen, also in my collection, measuring 5·5 millimetres in diameter, has three horizontal denticles in the first series, while the second series is similar to that in my other two specimens. It possesses, however, in addition, one posterior and two anterior denticles of a previous set, separated from the mature set by a distance of 1 millimetre.

Var. **compressa**, *Sykes*.

Plectopylis (*Sykesia*) *clathratula*, var. *compressa*, Sykes, Proc. Malac. Soc. London, iii, 1898, p. 72, pl. 5, figs. 13, 14; Gude, Science Gossip, N. S. vi, 1899, p. 75, fig. 101.

Differs from the type in being more elevated, in the more convex spire and the narrower umbilicus, while the raised ribs are scarcely visible. The armature is similar to that of the type.

Fig. 8.—*Ruthvenia clathratula* var. *compressa*.

The specimen figured is in Mr. Ponsonby's collection: it measures 5 millimetres in diameter, altitude 2·5 millimetres.

Hab. Ceylon: Ambagamuwa (*Collett*).

47. **Ruthvenia caliginosa**, *Sykes*.

Plectopylis (*Sykesia*) *caliginosa*, Sykes, Proc. Malac. Soc. London, iii, 1898, p. 72, pl. 5, figs. 21, 22; Gude, Science Gossip, N. S. vi, 1899, p. 75, fig. 100 (shell and armature).

Original description:—"Testa mediocriter umbilicata, lenticularis, acute carinata, superne costulis obscuris remotis ornata, parum nitens, corneo-brunnea, apice magno, obtuso; sutura bene impressa; anfr. 5, plano-convexi, lente accrescentes, ultimus basi inflatus, radiato-striatus; apertura verticalis, angusta, angulato-lunaris; peristoma simplex, acutum; plicæ et dentes sicut (?) in *P. clathratula*, sed dentes palatales pauci.

"Alt. 2·9, diam. 6 mm." (*Sykes.*)

Hab. Ceylon: Ambagamuwa (*O. Collett*).

"Shell slightly more elevated than *P. clathratula*, whorls a little flatter, base more inflated, the umbilicus being little more than

half the size, colour more brown ; the spiral liræ are absent, save for a faint trace above the suture of a single one, and the costæ almost obsolete ; the armature appears to be very similar, save that the palatal denticles are only three or four in number." (*Sykes.*)

The parietal armature consists of two simple, subvertical plates which are somewhat thickened and truncate at the lower, and attenuated at the upper extremities ; these plates are separated by a distance of a quarter of a whorl, and the posterior one is the stronger (see fig. 9 *d*, which shows the parietal wall with its two plates).

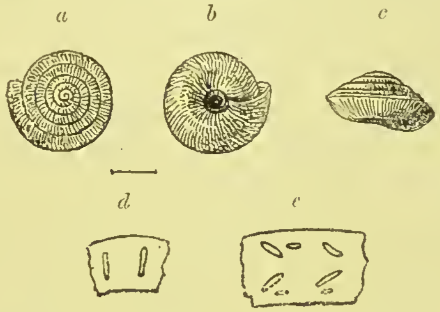

Fig. 9.—*Ruthvenia caliginosa.*

The palatal armature is in two vertical series : the anterior series consists of an obliquely ascending short quadrate tooth near the periphery, and below this an obliquely descending lamelliform tooth, with a slight, horizontally elongated denticle below its posterior extremity ; the posterior series is similar to the anterior one, but the teeth are stronger and thicker in the former, while there is in addition a horizontally elongated denticle on the anterior side of the upper tooth. The specimen shown in fig. 9 *a–c* measures 6 millimetres in diameter, alt. 3 millimetres, and is in the collection of Mr. Ponsonby. The armatures are figured from the type-specimen in the collection of Mr. Sykes, who kindly permitted me to open the shell for the examination of the armature.

48. **Ruthvenia biciliata,** *Pfeiffer.*

Helix biciliata, Pfeiffer, P. Z. S. 1855, p. 112 ; Hanley & Theobald, Conch. Ind. 1875, pl. 159, figs. 1 & 4.

Nanina (*Hemiplecta*) *biciliata,* Pfeiffer, Malak. Blätt. ii, 1856, p. 121.

Macrochlamys biciliata, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 45.

Nanina (*Kaliella*) *biciliata,* Tryon, Man. Conch. ser. 2, ii, 1886, p. 67, pl. 28, figs. 7 & 8.

Plectopylis (*Sykesia*) *bicilata,* Sykes, Proc. Malac. Soc. London, iii. 1898, pp. 66 & 160 ; Gude, Science Gossip, N. S. vi, 1899, p. 16, fig. 99 (shell and armature).

Sykesia biciliata, Godwin-Austen, Moll. India, ii, 1907, p. 196, pl. 112, fig. 3 (anatomy).

Original description :—" T. perforata, convexo-lenticularis, tenuis, pellucida, cornea, oblique plicata, bicarinata : carinis pilis longis ciliatis ; spira parum elevata, vertici subtili ; anfr. 4½ scalares, ultimus antice non descendens, basi vix convexus ; apertura subobliqua, depresse securiformis ; perist. simplex, rectum, marginibus subparallelis, columellari vix reflexiusculo.

" Diam. maj. 7½, min. 6½, alt. 3½ mill." (*Pfeiffer*.)

Hab. Ceylon (*Skinner*) ; Haputale (*Collett*) ; Patapolla (*Preston*).

The systematic position of this species remained uncertain for a long time, the shell having been referred by various authors to such different genera as *Hemiplecta*, *Macrochlamys*, and *Kaliella*. In 1898, Mr. Sykes, in identifying some shells—collected by Mr. Preston in Ceylon— as *Helix biciliata*, referred the species to *Sykesia*, a section of *Plectopylis* proposed by me in 1897 for the reception of *Helix clathratula* and *H. retifera*. When classifying all the known species of *Plectopylis* in 1899, I stated that when the anatomy of the forms referred to this section should come to be investigated, they would probably be found to differ so widely from typical *Plectopylis* that the section would rank as a separate genus. This has since been demonstrated to be the case by Lt.-Col. Godwin-Austen, who has examined the animal of *biciliata*, and has found, moreover, that it has close affinity with the genus *Thysanota*, placed, with some doubt, under *Eulota* by Prof. Pilsbry, but which appears to pertain to the *Endodontidæ*.

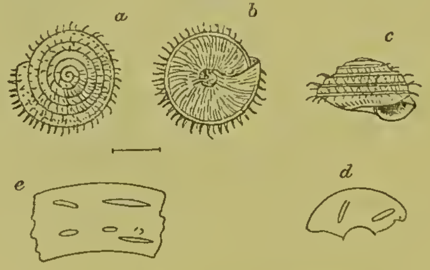

Fig. 10.—*Ruthvenia biciliata*.

The parietal armature consists of two simple obliquely ascending folds, separated by a distance of half a whorl, having the upper extremities somewhat attenuated and the lower truncate (see fig. 10 *d*, which shows the parietal wall with its two folds). The palatal armature is composed of : first, a short, horizontal fold below the periphery, a little further back but in a line with it a strong lamelliform denticle, ascending obliquely ; secondly, three denticles in a line horizontally and about equidistant, the posterior one strongest ; thirdly, a short slight horizontal fold near the lower suture, rising near the aperture and revolving as far as the second denticle (*cf.* fig. 10 *e*, which shows the inside of the outer

wall with the palatal armature). The shell shown in figs. 10 *a–c* is one collected by the late O. Collett, and is in Mr. Ponsonby's collection, while the armatures exhibited in figs. 10 *d* and *e* are drawn from a specimen brought home by Mr. Preston and which is in Mr. Sykes's possession.

Genus **PUPISOMA**, *Stoliczka*.

Pupisoma, Stoliczka, J. A. S. B. xlii, 1873, p. 32; Nevill, Hand List, i, 1878, p. 192; von Möllendorff, Nachr. Blatt., D. Malak. Ges. xx, 1888, p. 109; ibid., Ber. Senck. naturf. Ges. 1890, p. 223; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 52; Godwin-Austen, Land and Freshw. Moll. India, ii, 1910, p. 300 (jaw and radula).

"Shell minute, thin, brown, perforated; varying from pupiform, almost cylindrical, to globose-conoidal; apex obtuse; whorls rounded, with delicate, irregular, cuticular riblets. Aperture oblique, truncate-oval or rounded, the lip thin, simple or a little expanded, broadly dilated at the columella, nearly closing the umbilical perforation; the columellar edge sometimes slightly projecting, but hardly dentate." (*Pilsbry.*)

"The animals have very short pedicles and barely a trace of tentacles. They generally live on wood." (*Stoliczka.*)

Genitalia unknown.

"Radula exceedingly small; formula (*P. miccyla*):

8 . 6 . 1 . 6 . 8
14 . 1 . 14.

"The centre tooth is smaller than those on either side, it is tricuspid, the main point long, those on the side basal and wide apart. The admedian teeth are also tricuspid with indication on the fourth and fifth of two cusps on the outer side. The laterals are on long narrow plates, with four teeth alternately long and short. The jaw is composed of about eighteen vertical plates, not overlapping each other, each plate being separated by a very narrow clear space. The cutting-edge is sharply defined. Under the highest power it seemed apparent that these plates divided at the base and merged gradually into muscular tissue." (*Godwin-Austen.*)

Type, *Pupa lignicola*, Stoliczka.

Range. India, Ceylon, Borneo, Philippines, Japan, S. Africa.

Stoliczka regarded the group as a subgenus of *Pupa*, while von Möllendorff, in 1888, raised it to generic rank, provisionally placing it between *Buliminus* and *Pupa*, but two years later he referred it to the *Fruticicola* series in proximity to *Acanthinula* and *Zoogenites*. Pilsbry, not without some doubt, considered it a subgenus, a modification of *Pyramidula*, comparable to the American group *Ptychopatula*. He did not, however, include it in his synopsis of families, etc. (*vide* Index to the Helices, 1895,

p. 122). Godwin-Austen, finally, again raised it to generic rank in the *Endodontidæ*. He added descriptions of two new species, the radula of one being figured as well as the jaw and radula of *P. miccyla*. The latter he found so similar to those parts of *Philalanka thwaitesi* that he was led to place *Pupisoma* in the same subfamily *Thysanotinæ*, next to *Philalanka*. With regard to the animal of *Pupisoma miccyla*, he further states that the foot is short and too small to see any details of its anatomy, but that upon the minute animal being pressed out between covering-glasses, the eyes were found to be conspicuous, connected with a short dark streak representing the retractor muscle. He is of opinion that in life they probably merely reach the surface of the integument. Nearly every animal examined contained three embryonic shells, some in an advanced stage of development, showing the apex of the shell, and being very large compared with the parent animal.

Mr. Burnup also records its ovoviviparous character, many of the specimens of *P. orcula* and *P. japonicum*, taken in South Africa, being found to contain one young mollusc furnished with a shell, and some few containing two, one much larger than the other.

The presence of the genus in such widely separated localities as Japan and South Africa—even so far inland as Rhodesia—is very remarkable. I am inclined to think, however, that this cannot be its natural range but that these two species—*orcula* and *japonicum*—owe their distribution to the agency of man, having probably been carried with plants, for Mr. Burnup states that they are found not only on the trunks, branches, and leaves of native shrubs and trees in woods, but on orange and apple trees in orchards as well. Benson, when describing *P. orcula*, states the shells occurred in mango-groves, but in his description of *P. miccyla* he mentions that it was found on the bark of an orange tree, while Lt.-Col. Godwin-Austen also records the taking of a shell on an aurantiaceous plant in India (Land and Freshw. Moll. India, ii, 1910, p. 301), and others on orange trees in Ceylon (op. cit. p. 303), so that it may be presumed that these creatures do occur on cultivated plants and may thus be transported from one country to another.

49. Pupisoma lignicola, *Stoliczka*.

Pupa lignicola, Stoliczka, J. A. S. B. xl, 1871, p. 171, pl. 7, fig. 3.
Pupa (*Pupisoma*) *lignicola*, ibid., op. cit. xlii, 1873, p. 32; Nevill, Hand List, i, 1878, p. 192; Kobelt, Illustr. Conchyl. Buch, ii, 1878, p. 281, pl. 85, fig. 43; Godwin-Austen, Land and Freshw. Moll. India, ii, 1910, p. 300.
Pyramidula (*Pupisoma*) *lignicola*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 52, pl. 14, figs. 41, 42.

Original description:—"Pupa testa breviter tumide-ovata, subconica, cornea, vix rimata, apice obtusa; anfractibus 4½, convexiusculis, costulis modice distantibus, transversalibus, paulo

arcuatis, nonnunquam striis tenuioribus alternantibus, tectis, ad basin convecam obsoletis; apertura subrotundata: labio tenuissimo, levi; rarissimo denticulo parvulo mediano instructo; labro externo tenui, paululum dilatato, edentulo, in anfractum penultimum vix ascendente; columella ad basin sensim expansiuscula, regionem umbilicalem tegente, torta, infra subdenticulata.

"Diam. maj. 1·5; d. min. 1·2; alt. 2 min." (*Stoliczka.*)

Hab. Burma: Moulmein (*Stoliczka*); Rangoon (*Hungerford*).

"The animal is grey with somewhat darker, very short pedicles and almost obsolete tentacles. The columella of the shell is at the base peculiarly expanded, flattened, somewhat twisted, producing at the lower part a small denticle. The species was found on old masonry of the Great Pagoda at Moulmein, and on the opposite bank of the river at Martaban on similar wooden structures." (*Stoliczka.*)

Var. **unidentata**, *Godwin-Austen.*

Pupa lignicola, toothed variety, Stoliczka, J. A. S. B. xl, 1871, p. 172; Hanley & Theobald, Conch. Ind. 1876, pl. 160, fig. 6.
Pupisoma lignicola, var. *unidentata,* Godwin-Austen, Land & Freshw. Moll. India, ii, 1910, p. 300.

Stoliczka when describing the type states that "out of a great number of specimens only one was met with which has a small tooth about the middle of the inner or parietal lip." Hanley and Theobald in figuring the toothed variety do not mention its source but give the habitat Moulmein, so that it is probable the shell illustrated is the one recorded by Stoliczka.

50. **Pupisoma constrictum**, *Godwin-Austen.*

Pupa (*Pupisoma*) *constrictus,* Godwin-Austen, P. Z. S. 1895, p. 450, fig. B.

Original description:—"Shell turbinate, perforate; sculpture minutely costulate above, from the swollen portion forwards the surface is smoother; colour, pale ochraceous; spire conic; sides flat; apex pointed; suture impressed; whorls 5, convex, at the distance of half a turn in the spiral behind the aperture there is a sharp swelling of the whorl, marking apparently the position of the previous aperture, but this is not seen in any of the whorls above; aperture ovate, oblique; peristome much thickened and reflected, united by a thin callus on the body-whorl; sinuate below and on outer margin.

"Major diam. 2·1; alt. axis 2·2 mm." (*Godwin-Austen.*)

Hab. Andaman Islands: Port Blair, South Andaman.

"Animal not yet seen, and it is difficult to say where this species should find generic position. I sorted out from a tube full of minute shells eight specimens of this very curious and interesting species. Its sculpture is like that of *Pupisoma lignicola*, Stol.,

from Moulmein, and I think it better to place it near this than to create a new genus for it, which I at first intended; I think it best, however, to wait until someone else can examine the animal." (*Godwin-Austen.*)

It will be seen from the foregoing that Lt.-Col. Godwin-Austen

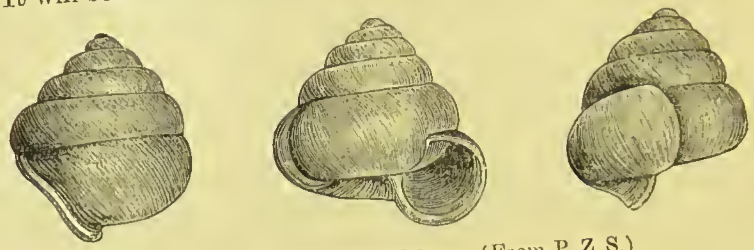

Fig. 11.—*Pupisoma constrictum.* (From P. Z. S.)

had some doubts as to the generic position of the species. Since, however, in contour as well as sculpture it accords well with the other members of the group, it may be retained here until an examination of the soft parts shall prove other relationship. In his synopsis of the Indian forms, in Land and Freshw. Moll. India, ii, 1910, p. 300, Lt.-Col. Godwin-Austen does not include the present species.

51. **Pupisoma orcula**, *Benson.*

Helix orcula, Benson, A. M. N. H. ser. 2, vi, 1850, p. 251; Reeve, Conch. Icon. vii, 1853, pl. 174, fig. 1176; Pfeiffer, Conch. Cab., Helix, iii, 1854, p. 357, pl. 136, fig. 18; Hanley & Theobald, Conch Ind. 1874, pl. 87, figs. 1, 4.

Pupa (Pupisoma) orcula, Nevill, Hand List, i, 1878, p. 192.

Hyalinia (Conulus) orcula, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 73.

Zonites (Hyalinia (Conulus)) orcula, Tryon, Man. Conch. ser. 2, iii, 1887, p. 177, pl. 53, fig. 67.

Pyramidula (Pupisoma) orcula, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 52.

Pupisoma orcula, Godwin-Austen, Land & Freshw. Moll. India, ii, 1910, p. 301; Hirase, Conch. Mag. iii, 1909, p. 26, pl. 9, figs. 30, 31; Burnup, Proc. Malac. Soc. London, x, 1912, p. 45; Conolly, Ann. S. Afr. Mus. xi, 1912, p. 159.

Original description:—"Testa vix perforata, conico-globosa, cornea, translucente, scabra, oblique irregulariter costulato-striatissima; apice obtuso; anfractibus $3\frac{1}{2}$ convexis, ultimo rotundato, sutura profunda; apertura obliqua rotundata spiram vix æquante; peristomate tenui acuto; margine columellari reflexo, perforationem semitegente.

"Diam. 2, axis 2 mill." (*Benson.*)

Hab. India: between Jounpore and Benares, Dinapore (*Bacon*), and whole route from Barrackpore, in Bengal, to borders of Sikkim

and thence to Chuprah in Behar. Lucknow aud Behar (under bark of trees, *Mainwaring*); N.W. Bengal (*Stoliczka*). Japan (*Hirase*). S. Africa: Cape, Natal, Transvaal, Rhodesia (*Burnup*, *Conolly*, and others).

I have already in the description of the genus referred to the remarkable distribution of this species and given my reasons for attributing its presence in such widely separated localities as Japan and South Africa to the agency of man.

52. **Pupisoma evezardi**, *Blanford*.

Pupa evezardi, (Blanford) Hanley & Theobald, Conch. Ind. 1875, pl. 101, figs. 5, 6.
Pupa (*Pupisoma*) *evezardi*, Nevill, Hand List, i, 1878, p. 192; Blandford, J. A. S. B. xlix, 1880, p. 199.
Pupisoma evezardi, Godwin-Austen, Land & Freshw. Moll. India, ii, 1910, p. 301.

Original description:—"Testa imperforata, vix subrimata, conoideo-ovata, tenuis, cornea, lineis elevatis irregularibus filiformibus obliquis ornata. Spira subtus subcylindracea, superne conoidea, lateribus convexis, apice obtuso, sutura impressa. Anfr. $4\frac{1}{2}$, convexi, regulariter crescentes, ultimus parum major, peripheria atque basi rotundatus, haud autice descendeus. Apertura diagonalis, truncato-rotunda, edentula; peristoma tenue, rectum, expansiusculum, marginibus conuiventibus, columellari verticali, ad basin subtorto, adnato-reflexo, regionem umbilicalem tegente.

"Long. $2\frac{2}{3}$, diam. fere 2, long. ap. 1 mm." (*Blanford*.)

Hab. India: Khandalla, between Bombay and Poona (*Evezard*).

"Shell imperforate, with scarcely even a trace of rimation in the umbilical region, conoidly ovate, thin, horny, with raised hair-like oblique lines, rather irregularly disposed, on all the whorls. Spire nearly cylindrical below, conoidal above, the sides convex, apex blunt, suture impressed. Whorls $4\frac{1}{2}$, convex; increasing in size regularly; the last but little larger than the penultimate, rounded at the periphery and below, not descendiug in front. Aperture diagonal, nearly circular, but truncated above, without teeth; peristome thin, all in one plane, slightly expanded, margins converging; columellar vertical above, slightly twisted below, reflected and united to the whorl so as completely to cover the umbilicus.

"If the form represented by Hauley in the 'Conchologia Indica' be precisely the same as that described above, I am inclined to question the locality given, "Singhur" or, as Mr. Theobald prefers writing it, "Synghar," presumably Singarh near Poona. The original specimens were found by Col. Evezard at Karkalla, near Khandalla, at the head of the Bor-Ghat; and I suspect that Hanley's figure was taken from one of them. There are two or three allied forms found in the Syhadri range

and the Nilgiris, forms that do not appear hitherto to have been described.

"... *P. lignicola*, a form very closely resembling *P. evezardi*, but rather shorter and less ovate." (*Blanford.*)

53. Pupisoma seriola, *Benson.*

Ennea seriola, Blanford, J. A. S. B. xxx, 1861, p. 359 (nom. nud.).
Pupa seriola, Benson, A. M. N. H. ser. 3, xii, 1863, p. 427; Hanley & Theobald, Conch. Ind. 1875, pl. 101, fig. 8.
Pupa (Pupisoma), No. 54, n. sp., Nevill, Hand List, i, 1878, p. 192.
Pupa (Pupilla) seriola, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 354.
Pupisoma seriola, Godwin-Austen, Land & Freshw. Moll. India, ii, 1910, p. 301.

Original description:—"P. testa vix perforata, ovato-oblonga, subcylindracea, oblique striatula, sericina, flavescente, cornea, spira oblonga, apice obtusiusculo, sutura impressa; anfractibus 5, superioribus convexis, ultimo convexiusculo antice vix ascendente; apertura subovata, superne angulata, dente 1 parietali mediano remotiusculo induta; peristomatis marginibus callo tenui junctis, dextro vix, columellari superne late expanso." (*Benson.*)

Long. $2\frac{1}{2}$, diam. $1\frac{1}{3}$ mill.

Hab. India: Cuttack, Orissa (*Theobald*); Darjeeling, Terai, and Nawade near Muddapur (*Mainwaring*).

The species is included here with some doubt. Benson alluded to the fact that Blanford considered it an *Ennea*, but he regarded it as having more affinity with *Bulimus*. He also stated that in one of the specimens the parietal lamina was not apparent. Hanley and Theobald observe that the type having been smashed, and an imperfect photograph alone preserved, they cannot vouch for the correctness of the figure. Although they do not expressly state the fact, the natural inference is that their illustration has been prepared from this photograph.

54. Pupisoma miccyla, *Benson.*

Helix miccyla, Benson, A. M. N. H. ser. 3, v, 1860, p. 384; Hanley & Theobald, Conch. Ind. 1875, pl. 129, figs. 8, 9.
Hyalinia (Conulus) miccyla, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 73.
Zonites (Hyalinia (Conulus)) miccyla, Tryon, Man. Conch. ser. 2, ii, 1886, p. 176, pl. 53, fig. 64.
Pyramidula (Pupisoma) miccyla, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 52.
Ernstia miccyla, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 271.
Pupisoma miccyla, Godwin-Austen, Land & Freshw. Moll. India, ii, 1910, p. 301, pl. 132, figs. 1, 1^a, 1^b (shell), fig. 1^c (teeth of radula), fig. 1^d (jaw).

Original description:—"Testa imperforata, globoso-conoidea, tenui, striatula, nitidula, fusco-cornea, translucente: spira trun-

cato-conica, sutura impressa, apice obtusissimo; anfractibus 4, convexis, ultimo globoso, antice sensim descendente; apertura lunato-rotundata, obliqua, peristomate acuto, margine dextro arcuato, columellari acuto, verticali, cum basali angulum fere rectum efformante." (*Benson.*)

Long. $1\frac{1}{2}$, diam. 1 mill.

Hab. Ceylon: Matelle (*Layard*), Watawala (*Collett*).

Benson recognized its affinity to *P. orcula*, stating that *P. miccyla* is smaller, destitute of the peculiar sculpture of that species, and distinguished by its very obtuse apex and by the formation of the columellar lip. Lt.-Col. Godwin-Austen, who received from the late O. Collett a number of shells with the soft parts preserved in formalin, states that *miccyla* is smaller than *lignicola*, has a greater number of whorls, and is more attenuate than *orcella*, while the transverse striæ of the cuticle appear to be more regular. These specimens enabled him to examine and figure the jaw and radula, and thus to fix the systematic position of the group.

55. **Pupisoma cacharicum**, *Godwin-Austen.*

Pupisoma cacharica, Godwin-Austen, Land & Freshw. Moll. India, ii, 1910, p. 303, pl. 132, fig. 4.

Original description:—"Shell scarcely perforate, globosely conoid, very tumid, corneous; sculpture, spiral striation, crossed by fine close thread-like ribbing; colour pale umber-brown; spire moderately high, conic, apex blunt; suture open; whorls $3\frac{1}{2}$, rapidly increasing, very convex; aperture nearly circular, oblique; peristome thin, columellar margin perpendicular, reflected." (*Godwin-Austen.*)

Major diam. 1·33, alt. 1·5 mill.

Hab. India: Silchar (*Wood-Mason*).

The species is based on specimens sent for determination by Dr. Annandale from the Indian Museum. They were accompanied by the following notes:—"From the branches of a Pepul tree, in scars and other shallow cavities, opposite the Deputy Commissioner's Cutchery, Silchar, 3.4.81. Only one pair of short, thick, blunt, sausage-shaped tentacles, at the upper extremity of which the black eye-spots are placed. Animal semitransparent, greyish, milky white below, above grey; retractor muscles of tentacles very plainly visible through integument. No tail-gland."

56. **Pupisoma longstaffæ**, *Godwin-Austen.*

Pupisoma longstaffi, Godwin-Austen, Land & Freshw. Moll. India, ii, 1910, p. 303, pl. 132, figs. 3 (shell), 3^a (jaw), 3^b (radula).

Original description:—"Shell imperforate, very globosely conoid; sculpture, a smooth epidermis, with very fine, somewhat distant costulation; colour pale brown; spire depressed; whorls 3,

very tumid and well rounded on the periphery; aperture nearly circular; peristome thin; columellar margin thickened and slightly reflected and extending as a callus on to the last whorl." (*Godwin-Austen.*)

Hab. Ceylon: Kandy (*Mrs. Longstaff*).

"This shell is more globose than *P. miccyla* and not so high in the spire, which tapers more rapidly. It is also costulate, as in the *Pupisoma* figured on plate 132, fig. 2, a single specimen of which was sent to me by Mr. Sykes, and cannot now be found. Mrs. Longstaff writes:—"Numerous on palm, Florence Hotel Garden, Kandy. Animal, body light grey, only one pair of tentacles, dark. Tail pointed."

"I was fortunate in seeing the radula in the first specimen I examined. Nothing could be seen of the genitalia. The mantle-zone was simple, with no shell-lobes.

'There are not many teeth in the row, only some 15 or 16; all are large quadrate plates. The central tricuspid, the admedians and laterals bicuspid, the inner cusp long, the outer small and basal. The jaw was crumpled up, and being so minute was not well seen, but it appeared to be smooth.' (*Godwin-Austen.*)

Genus SPHYRADIUM, *Charpentier.*

Sphyradium, Charpentier, Neue Denkschr. Allg. Schweiz. Gesells. Naturw. i, 1837, 2nd art. p. 15 (as section of *Pupa*); Sterki, Nautilus, x, 1896, p. 75.

Paludinella, Lowe, P. Z. S. 1854, p. 206.

Edentulina, Clessin, Deuts. Excurs. Moll. Fauna, 1876, pp. 189, 208 (non Pfeiffer, 1856, sect. *Ennea*).

Columella, Westerlund, Fauna Paläarct. iii, 1887, p. 125.

Range. Europe; North America; India.

Shell cylindrical, pupoid; aperture radial; peristome simple, straight, with thin margins.

Anatomy unknown.

"Jaw low, composed of distinct plates. Radula with the teeth comparatively small, their cusps very short and small; transverse rows of teeth in *edentulum* varying from 116 to 127, each row containing 1+21 (20). The centrals are tricuspid, the laterals all bicuspid except the last, which is a minute nodule; in the others there is no difference of laterals and marginals, but that the plates of attachment become shorter towards the margins and evanescent in the outer teeth. The radula is 0·55 mill. long, 0·14 wide." (*Sterki.*)

The species constituting the group *Sphyradium* were for a long time regarded as pertaining to *Pupa* until Dr. Sterki, in 1896, from an examination of the radula and jaw of *S. edentulum*, came to the conclusion that *Sphyradium* was more nearly allied to *Punctum*. On conchological grounds he had already previously held the opinion that it had no affinity with *Pupa*. He alludes

to the analogous case of "*Pupa*" *neozelanica*, Pfr., which has much the same form of shell, and was shown by Mr. Suter, a few years previously, to be a member of the *Charopidæ*.

56 *a*. **Sphyradium himalayanum**, *Benson*.

Pupa himalayana (Hutton), Benson, A. M. N. H. ser. 3, xii, 1863, p. 428; Hanley & Theobald, Conch. Ind. 1875, pl. 101, fig. 4; Theobald, J. A. S. B. xlvii, 1878, p. 146.
Pupa (*Sphyradium*) *himalayana*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 352.

Original description:—"P. testa rimato-perforata, ovato-oblonga, subcylindracea, oblique minutissime costulata, translucente, pallide cornea; spira oblonga, apice obtuso, sutura impressa; anfractibus 7, brevibus, convexis, ultimo antice leviter ascendente; apertura rotundato-ovata, edentata; peristomate tenui, margine expansiusculo, dextro superne leviter antice progrediente." (*Benson*.)

Alt. 2, diam. 1 mill.

Hab. India: Simla and Mussoori (*Hutton*); Panjal Range, Kashmir (*Theobald*).

Four specimens in the Theobald collection, in the British Museum, have enabled me to satisfy myself that this species is in all probability congeneric with *S. edentulum*.

Subfamily PYRAMIDULINÆ.

Genus **PYRAMIDULA**, *Fitzinger*.

Pyramidula, Fitzinger, System. Verz. Oesterr. vork. Weichth. 1833, p. 95; Westerlund, Fauna Paläarct., Binnenconchyl. i, 1889, p. 10 (as group of *Patula*); Pilsbry. Man. Conch. ser. 2, ix, 1893, p. 42, pl. 40, figs. 40, 46 (animal), pl. 11, figs. 17–28 (anatomy).

Type, *Helix rupestris*, Drap.

Range. Northern Temperate Land Area.

"Shell openly umbilicated, varying in contour from flattened and disk-like to conoidal. Generally opaque, often rib-striate. Unicoloured, spirally banded or flammulate. Whorls subcylindrical or keeled, the apex generally smooth. Aperture rounded-lunate; lip simple and thin.

"Animal having *the sole undivided*; *lateral margin of the foot with a distinct border bounded by a groove*, the grooves meeting above the tail. No caudal mucous pore. Eye-peduncles long and slender.

"Genital system lacking all accessory organs; vas deferens and retractor muscle inserted near or at the apex of the penis; duct of the spermatheca very long; hermaphrodite duct very long, but shortened by its extreme convolution.

"Jaw arcuate, its component laminæ generally compactly soldered, and indicated only by fine striæ which diverge slightly from the middle.

"Radula (1) having only the mesocones developed upon central and inner lateral teeth, or (2) having the centrals tricuspid, laterals bicuspid lacking the entocones, marginal teeth similar but with short basal-plates; this being the usual form. In some species the marginal teeth are multicuspid by the splitting of their ectocones.

"The dentition as usual, shows considerable variation, even in species otherwise closely related. As a general rule, the lateral teeth completely lack entocones, differing in this respect from *Trachycystis* and the *Endodonta–Charopa* series; but in the section *Helicodiscus*, entocones are well developed. The dentition is quite unlike *Trachycystis* in the form of the marginal teeth.

"The genus *Pyramidula* consists of dull-coloured ground-living snails, species of which occur over the whole northern temperate land area. Its nearest relatives are *Charopa*, *Trachycystis*, and *Stephanoda*, genera occupying the southern temperate regions of Australasia, Africa, and South America respectively. All may be regarded as the remnants of an early fauna, now replaced in the tropics, and to a large extent in temperate regions also, by higher groups of Helices. The latter differ widely from these Patuloid genera in lacking parapodial grooves, in the solid, ribbed jaw, complex genital system, and other features.

"In treating of the subgenus *Patula* it will be shown that that name is not available as a designation for the present genus as a whole. *Pyramidula* is the earliest name, and should be accepted. It may be objected that no diagnosis of *Pyramidula* was published by Fitzinger, but the same may be said of Beck's genera. Let those who repudiate Beck's names cast the first stone at Fitziuger!" (*Pilsbry.*)

Section Pyramidula, *Fitzinger*, s. str.

Pyramidula, Fitzinger, op. cit., p. 95; Pilsbry, tom. cit., p. 43.

Type, *Helix rupestris*, Drap.

Range. Europe and Central Asia.

"Shell minute, openly umbilicated, with pyramidal spire and obtuse smooth apex. Whorls tubular, obliquely striated. Aperture round or nearly so; lip simple.

"Jaw arcuate, finely striated vertically.

"Radula having the central teeth unicuspid, the side cusps being represented by a slight sinuation. Laterals bicuspid. Marginals with low wide basal-plate, the inner bearing two cusps, the outer becoming multicuspid by splitting of the cusps.

"This section differs from *Gonyodiscus* and *Patulastra* in having the spire conically elevated, and from the former in lacking rib-striæ." (*Pilsbry.*)

Only two species are known from the Indian Peninsula, and a doubtful one from Ceylon, these being the most southern outliers of the section.

57. **Pyramidula humilis**, *Benson.*

Helix humilis (Hutton), Benson, J. A. S. B. vii, 1838, p. 217; Pfeiffer, Mon. Helic. Viv. i, 1847, p. 106; Reeve, Conch. Icon. vii, 1851, pl. 133, fig. 825; Pfeiffer, Conch.-Cab., Heliceen, iii, 1853, p. 322, pl. 129, fig. 28; Hanley & Theobald, Conch. Ind. 1874, pl. 61, figs. 4–6.

Helix (Patula) humilis, Pfeiffer, Malak. Blätt. ii, 1856, p. 125; Nevill, Sci. Res. Second Yarkand Miss. 1878, Mollusca, p. 18; ibid., Hand List, i, 1878, p. 66.

Vallonia humilis, Theobald, J. A. S. B. l, 1881, p. 47.

Patula (Discus) humilis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 90.

Helix (Patula (Discus)) humilis, Tryon, Man. Conch. ser. 2, iii, 1887, p. 22, pl. 3, figs. 4–6.

Pyramidula (s. s.) *humilis*, Pilsbry, Man. Conch. ser. 2, ix, 1893, p. 44.

Original description :—" Testa parvula, couvexo-depressa, cornea, late et profunde umbilicata; aufractibus quinque rotundatis, ultimo subangulato, penultimo aperturam circularem vix interrumpente; peritremate acuto.

" Diam. 0·125 poll." [=3 mill.]. (*Benson.*)

Hab. India: Chur, near Simla (*Stoliczka*); Landour (*Reeve*); Simla (*Stoliczka*, *Oldham*); Murree (*Stoliczka*); Tandiana (*Theobald*).

58. **Pyramidula euomphalus**, *Blanford.*

Helix euomphalus, Blanford, J. A. S. B. xxx, 1861, p. 354; Pfeiffer, Mon. Helic. Viv. v, 1868, p. 138.

Helix euomphalos, Hanley & Theobald, Conch. Ind. 1875, p. 52, pl. 129, figs. 1–3.

Patula (Patulastra) euomphalus, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 87.

Helix (Patula) (Punctum)) euomphalus, Tryon, Man. Conch. ser. 2, iii, 1887, p. 32, pl. 7, figs. 75–77.

Pyramidula (s. s.) *euomphalus*, Pilsbry, Man. Conch. ser. 2, ix, 1893, p. 44.

Original description :—" Testa mediocriter umbilicata, subturbinata, depressa, fulvo-cornea, tenuis, oblique striata; spira conoidea, apice obtusa, sutura valde impressa. Anfr. 4 rotundati, sensim accrescentes, ultimus vix descendens, subteres. Apertura obliqua, rotundato lunaris; peristoma simplex, rectum, marginibus distantibus, sinistro haud reflexo. Umbilicum perspectivum.

" Diam. maj. 2, min. $1\frac{3}{4}$, alt. 1 mm." (*Blanford.*)

Hab. India: near Pykara, Nilgiri Hills (*Blanford*).

" This shell in its form somewhat resembles a minute *H. tapeina*, Bens., with more rounded whorls, deeper sutures, and a non-expanded lip." (*Blanford.*)

The species was not figured by Blanford, as he states that unfortunately the specimen, forwarded to him by his brother for that purpose, was crushed before it reached him. Hanley and Theobald, however, give a representation of the shell, the specimen figured probably originating from the same source.

59. **Pyramidula ? halyi**, *Jousseaume.*

Trichia halyi, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 271, pl. 4, fig. 2.

Original description :—" Testa parva, late et profunde umbilicata, globoso-conica, irregulariter striatula, vix nitida, subopaca, corneo fusca, spira conoidea, apice obtusa ; anfr. 4 rotundati, sutura profunda separati, ultimus non descendens, superne planulatus ; apertura perobliqua, subcircularis ; perist. simplex, acutum, rectum, margine umbilicari non reflexo.

" Diam. et alt. 1·5 mm." (*Jousseaume.*)

Hab. Ceylon : Nuwara Eliya (*Simon*).

This species, referred to *Trichia* by Jousseaume—a genus certainly not represented within the limits of the Indian Empire —I place here not without some doubt, but no other genus appears so well fitted for its reception, and we have already two species in the Indian Peninsula, one of them in the Nilgiri Hills, and since the fauna of Ceylon shows many traces of affinity with that of Southern India, the extension of the genus to Ceylon offers no insuperable difficulties. One of Jousseaume's figures—that showing the inferior side—has been drawn by the artist as a sinistral shell, the other two figures being correctly shown as dextral.

Family HELICIDÆ, *Pilsbry.*

Subfamily ACAVINÆ, *Pilsbry.*

Genus **ACAVUS**, *Montfort.*

Acavus, Montfort, Conch. Syst. ii, 1810, p. 234 ; Semper, Reisen Arch. Philippinen, Wiss. Res. 2, iii, 1870, p. 99 (anatomy) ; Sarasin, Ergebn. Naturw. Forsch. Ceylon, i, 1888 (embryology) ; Binney, Ann. N.Y. Acad. Sci. iii, 1884, p. 92 (dentition) ; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 153 ; Randles, Proc. Malac. Soc. London, iv, 1900, p. 103 (anatomy).

Oligospira, Ancey, Conch. Exch. ii, 1887, p. 22.

Acavella, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 288.

Type, *Helix hæmastoma*, Linné.

Range. Ceylon.

" Shell imperforate, globose depressed or globose trochoidal, solid, *bright coloured.* Whorls less than 5, rapidly increasing, *the several earlier forming the nuclear or embryonic shell, which is about one-third the diameter of the adult.* Last whorl deflexed in front. Aperture very oblique, the *lip vividly coloured and broadly expanded* ; columellar margin long, obliquely descending, *broadly flattened*, the columellar lip adnate.

" Animal with undivided sole and no pedal grooves : *lung and*

kidney very short, the latter [former?] opening at the base of the kidney. Body-lobes of the mantle present, of moderate or small size.

"Jaw strong, low arcuate, entirely smooth, without median projection.

"Radula having the teeth all unicuspid.

"Genital system having no accessory organs. Penis having terminal retractor, the interior with two longitudinal pilasters below, with a very short, imperforate papilla at their base, at the base of which the vas deferens enters. Spermatheca on a *very short duct*. Eggs very large, oval, hard-shelled.

"The genus *Acavus* comprises Ceylonese Helices of large size and superb colouring. The shell is capacious, with a broad, polished lip of vivid red, lilac, or intense black hue. The young shells at the time of their extrusion from the egg are bright coloured, with round periphery, and are about one-third the size of the adult. The teeth are all unicuspid, but the marginals have shorter cusps than in *Helicophanta* or *Panda*; and the shell differs from these groups in its broad columellar lip and brilliant colouring. They are arboreal in habit." (*Pilsbry*.)

60. **Acavus hæmastoma**, *Linné*.

Helix hæmastoma, Linné, Syst. Nat. ed. 10, i, 1758, p. 773; Férussac, Hist. Nat. Moll. 1821, pl. 32^{b}, figs. 1, 2, 5; Wood, Index Testac. 1825, pl. 34, fig. 127; Donovan, Natural Repos. iv, 1834, pl. 132; Sowerby, Conch. Man. 1839, fig. 267; Hartmann, Gastr. Schweiz, iii, 1844, pl. 56, figs. 1–5; Pfeiffer, Conch.-Cab., Heliceen, i, 1846, p. 31, pl. 3, figs. 1, 2; Chenu, Illustr. Conchyl. 1851, *Helix*, pl. 3, figs. 18, 19; Reeve, Conch. Icon. vii, 1852, pl. 71, fig. 366; Adams, Genera, 1858, pl. 77, fig. 6^{a}; Semper, Reisen Arch. Philippinen, 2, iii, 1870, p. 99, pl. 12, figs. 8–10 (anatomy); Hanley & Theobald, Conch. Ind. 1875, pl. 127, fig. 2; Kobelt, Illustr. Conch. Buch, 1879, pl. 68, fig. 10; Woodward, Man. Moll. ed. 4, 1880, pl. 12, fig. 1; Tryon, Struct. Conch. iii. 1884, p. 45, pl. 95, fig. 75.

Acavus hemastomus, Montfort, Conch. Syst. ii, 1810, p. 235, pl. 59; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 287.

Helix (*Acavus*) *hæmastoma*, Beck, Index, 1838, p. 37; Nevill, Hand List, i, 1878, p. 80; Westerlund, Vega Exp. Vetensk. Jakt. iv, 1887, p. 141.

Acavus hæmastoma, Adams, Genera Moll. ii, 1858, p. 195, pl. 77, fig. 6 *a*.

Helix (*Macroön* (*Acavus*)) *hæmastoma*, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 78, pl. 18, figs. 22–25.

Acavus hæmastomus, Chenu, Man. Conchyl. i, 1860, pl. 34, fig. 127; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 154, pl. 38, fig. 1 (shell), pl. 48, fig. 14, pl. 50, fig. 3 (anatomy); Randles, Proc. Malac. Soc. London, iv, 1900, p. 103, pl. 9, figs. 9, 12 (anatomy).

"Shell globose-conical, white, brown above and usually brown around the umbilicus; aperture very oblique; columella not truncated where it joins the basal lip.

"The shell is solid and opaque, with rounded periphery and conoidal spire. It is porcelaneous white, but dull, not polished when in a natural condition; the whole surface above the periphery is usually of a reddish-brown hue, becoming paler of a brownish flesh-colour on the embryonic three whorls, and pink on the inner two; at and below the periphery there is a white zone which covers the base, or is limited by a brown tract upon the umbilical region; the suture is often edged by a white line. The surface has rather rude but inconspicuous lines of growth, and under a strong lens is seen to be covered by a dense minute pattern of incised criss-cross scratches; the embryonic whorls have radiating subregular striæ, cut by subobsolete spiral engraved lines. Whorls nearly 5, convex, the last flattened and sloping above, a little descending in front. Aperture very oblique, oblong-truncate, white inside, showing faintly the bands of outer surface. Entire peristome broadly reflexed, of a bright pinkish-red colour typically; columellar margin long, oblique, very broadly expanded and adnate to the base, flat, with a curved excavation at the place of the umbilicus; parietal wall covered by a heavy callus of the same colour as the lip." (*Pilsbry.*)

Major diam. 49, min. 38 mm.; alt. 39 mm.

Hab. Ceylon (*Blanford, Nevill, Collett*); Galle (*Simon*).

Mörch records the species from Coromandel (Journ. Conchyl. xx, 1872, p. 336), and Benson states that it occurs in the Nicobars as well as Ceylon (A. M. N. H. ser. 2, xviii, 1856, p. 97). As neither of these records has ever been confirmed, and as, moreover, the genus is believed to be confined to Ceylon, these two reputed habitats may without hesitation be disregarded.

The banding varies to some extent in this species, and, assuming the normal bands to be five, as in the Palæarctic *Cepæas*, the most common form is represented by the following formula: (1 2 3) 0 5 or (1 2 3) 0 0; a specimen in my collection exhibits only two bands—1 2 0 0 0—while another appears to have the five bands confluent in two series, thus: (1 2 3) (4 5), which is also the case with the shell figured in Conch. Ind. pl. 127, fig. 2. Lastly, a shell I received from Col. Parry shows four thin bands, 1 2 3 0 5, the second band being a mere thread. I also possess several specimens without any bands. Analogous arrangements obtain in the var. *melanotragus*, specimens in my collection providing the following formulas: 1 (2 3) 0 0, (1 2 3) 0 0, 1[1] (2 3) 0 0.

Var. **melanotragus**, *Born.*

Helix melanotragus, Born, Index, 1778, p. 400; ibid., Test. Mus. Cæs. Vindob. 1780, p. 388; Pfeiffer, Conch.-Cab., Heliceen, i, 1846, p. 32, pl. 3, figs. 4, 5; Chenu, Illustr. Conchyl. 1851, pl. 5, fig. 2; Hanley & Theobald, Conch. Ind. 1875, pl. 127, fig. 3.
Acavus melanotragus, Adams, Genera Moll. ii, 1858, p. 195; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 287.
Helix (*Acavus*) *melanotragus*, Nevill, Hand List, i, 1878, p. 80.

Helix (Acavus) hæmastoma, var. *melanotragus*, Nevill, J. A. S. B. 1, 1881, p. 133.
Helix (Macroön (Acavus)) hæmastoma, var. *melanotragus*, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 79, pl. 18, fig. 24.
Acavus hæmastomus, var. *melanotragus*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 154.

"Peristome and a broad band across the parietal wall black; a white spot at the insertion of the columella.

"This variety is nearly as abundant as the typical red-lipped form." (*Pilsbry.*)

The colouring of the bands is darker than usually obtains in the typical form, being a blackish brown.

Hab. Ceylon (*Nevill, Blanford*): Kandy (*Simon*).

Var. **conus**, *Pilsbry.*

Helix (Macroön (Acavus)) hæmastomus, var. *conus*, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 79, pl. 16, fig. 7.
Acavus hæmastomus, var. *conus*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 154.

Original description:—"More elevated than the type, with which it agrees in the colour of the outside. The entire peristome, columella, and a broad band across the parietal wall are a beautiful lilac or purple colour; a rather deep excavation at the place of the umbilicus.

"Diam. 35, alt. 36 mill." (*Pilsbry.*)

Var. **concolor**, *Pilsbry.*

Helix hæmastoma, var. *concolor*, Pilsbry, Nautilus, iv, 1890, p. 59.
Acavus hæmastoma, var. *concolor*, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 303.

Original description:—"Unicoloured chestnut all over, the two earlier whorls and a narrow umbilical crescent pink; lip and parietal wall red. No spiral white zones or bands. Form normal." (*Pilsbry.*)

61. **Acavus fastosus**, *Albers.*

Helix fastosa, Albers, Malak. Blätt. i, 1854, p. 213; Pfeiffer, Novit. Conch. ser. 1, i, 1855, p. 40, pl. 11, figs. 1, 2; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 197; Hanley & Theobald, Conch. Ind. 1875, pl. 127, fig. 5.
Helix melanotragus, Férussac, Hist. Nat. Moll. 1821, pl. 32 B, figs. 2, 3, 4 (*non* Born).
Helix (Acavus) fastosa, Pfeiffer, Malak. Blätt. ii, 1856, p. 144.
Helix (Acavus) fastuosa, Martens, Die Heliceen, ed. 2, 1860, p. 172.
Helix (Macroön (Acavus)) fastosa, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 79, pl. 16, figs. 5, 6.
Acavus fastosus, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 154.

Original description:—"T. imperforata, globoso-conica, regulariter confertim striata, albida, oblique fulvo-strigata et multi-

fasciata; spira conica, obtusula; aufr. 4½ convexiusculi, rapide accrescentes, ultimus antice descendens, peripheria obsoletissime subangulatus; apertura diagonalis, oblique oblonga, intus alba; perist. hepaticum, marginibus callo nigro-castaneo nitido, intrante junctis, supero leviter arcuato, expanso et reflexiusculo, columellari declivi, plano, perdilatato, adnato.

"Diam. maj. 38, min. 30, alt. 27 mill." (*Albers.*)

Nearly allied to *A. hæmastoma*, but appears to differ in being less solid, having more convex whorls—the base being decidedly more convex, but not gibbous behind the columellar margin as in *hæmastoma*, while the lip is reflexed but not expanded as in the latter. The numerous narrow encircling bands also distinguish it. A specimen, however, acquired by me from the H. Nevill collection, exhibits two blackish-brown zones above the periphery—one narrow, under the suture, and the other broad, separated from the first by a narrow light zone and extending to the periphery—as often observed in *hæmastoma*. In addition there are below the periphery five more or less distinct linear bands. These zones and bands may be indicated by the following formula: $1(23)^{3\ 44\ 55}$. This shell is well represented by figs. 3 and 4 on plate 32 B of Férussac's work, except that these show an additional linear band between the two dark zones.

When describing the shell, Albers gave the Malay Peninsula as habitat. This was already called in question by Pfeiffer in 1855, while in 1859 he definitely indicated Ceylon as its origin.

62. Acavus prosperus, *Albers.*

Helix prospera, Albers, Malak. Blätt. iv, 1857, p. 93, pl. 1, figs. 7, 8; Hanley & Theobald, Conch. Ind. 1876, pl. 150, fig. 4.
Helix (Acavus) prospera, Martens, Die Heliceen, ed. 2, 1860 p. 172.
Helix (Macroön (Acavus)) prospera, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 80, pl. 17, figs. 14, 15.
Acavus prosperus, Pilsbry, ibid. ix, 1894, p. 154.

Original description:—"Testa imperforata, orbiculato-globosa, solida, distincte striata, unicolor castaneo-purpurascens; spira parum prominens, globosula, vertice rosea; anfractus 4 convexi, modice accrescentes, ultimus antice non protractus, mediocriter descendens; apertura obliqua, oblongo-lunaris, basi rotundata, intus lactea; peristoma purpureum, expansum, breviter reflexum, margine dextro medio inflexiusculo, superne arcuato, columellari stricto, dilatato, vix excavato, sensim in basalem transeunte; paries aperturalis callo purpureo obductus.

"Diam. maj. 44, min. 34, alt. 25 millim." (*Albers.*)

Hab. Ceylon.

It is stated to differ from *A. hæmastoma* in being more globose, the depressed spire, rounded above, not conical, and in being unicolorous.

63. **Acavus phœnix**, *Pfeiffer.*

Helix phœnix, Pfeiffer, Malak. Blätt. i, 1854, p. 53; Hanley & Theobald, Conch. Ind. 1875, pl. 127, fig. 6.
Helix melanotragus, Férussac, Hist. Nat. Moll. 1821, pl. 32 B, fig. 6 (var. *a*); Donovan, Natural. Repos. iv, 1834, pl. 133; Pfeiffer, Conch.-Cab., Heliceen, i, 1846, pp. x & 32, pl. 3, fig. 3, pl. 7, figs. 9, 10; Chenu, Illustr. Conchyl.*, 1851, pl. 5, fig. 1; Reeve, Conch. Icon. vii, 1852, pl. 71, fig. 367.
Helix (Acavus) melanotragus, Beck, Index, 1838, p. 37.
Helix (Macroön (Acavus)) phœnix, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 80, pl. 17, figs. 10–12.
Acavus phœnix, Adams, Genera Moll. ii, 1858, p. 195; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 154, pl. 50, fig. 5 (radula), fig. 4 (egg); Randles, Proc. Malac. Soc. London, iv, 1900, p. 103, pl. 9, figs. 1, 4, 13 (anatomy).

Original description:—"T. imperforata, globoso-conoidea, tenuiuscula, leviter rugata, subunicolor castanea, vel fusco, roseo et luteo radiatim variegata, non fasciata, rarius roseo-albida; spira brevis, convexo-conoidea, vertice subtili, obtuso, albido; sutura mediocris, plerumque fusco marginata; anfr. 4 convexi, rapide accrescentes, ultimus ventrosus, plerumque spiraliter obsolete sulcatus, antice inflatus, sensim descendens; apertura perobliqua, truncato-oblonga, intus lactea; perist. late expansum et reflexum, castaneo-limbatum, marginibus callo albo, extus castaneo-marginato, junctis, dextro superne arcuato, columellari declivi, substricto, antice subtruncato, sursum perdilatato, plano.

"Diam. maj. 58, min. 43, alt. 38 mill." (*Pfeiffer.*)

Hab. Ceylon (*Blanford, Nevill*).

Readily distinguished from *A. hæmastoma* by its larger size, the more inflated whorls, and rather more depressed spire. The bands or zones of that species are usually lacking, but I have before me two specimens from the H. Nevill collection which show a subsutural and two supra-peripheral bands, the former and one of the latter very distinct for the greater part but disappearing on the latter half of the last whorl. Many specimens from the same collection are transversely streaked, others are much paler with brown peristome, some being almost white with rosy lip, and one is an albino having a pure white peristome.

From *A. superbus* and *A. grevillei* it may be separated at once by the more globose body-whorl and the less truncated columellar plate.

64. **Acavus superbus**, *Pfeiffer.*

Helix superba, Pfeiffer, Zeitschr. Malak. vii, 1850, p. 71; Reeve, Conch. Icon. vii, 1852, pl. 71, fig. 368; Pfeiffer, Conch.-Cab., Heliceen, iii, 1853, p. 342, pl. 133, figs. 1, 2; Hanley & Theobald, Conch. Ind. 1875, pl. 127, fig. 4.

* This work contains two different plates of *Helix* numbered 5 and two numbered 8.

Helix (Acavus) superba, Pfeiffer, Malak. Blätt. ii, 1856, p. 144; Nevill, Hand List, i, 1878, p. 80.
Acavus superbus, Adams, Genera Moll. ii, 1858, p. 195; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 154; Randles, Proc. Malac. Soc. London, vi, 1900, p. 103, pl. 9, figs. 3, 14 (anatomy).
Helix (Macroön (Acavus)) superba, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 81, pl. 16, figs. 3, 4.

Original description.—" T. imperforata, semigloboso-turbinata, solida, irregulariter malleata et cingulis obtusis parum elevatis munita, haud nitida, opaca, castanea; spira brevis, conoidea, apice obtusiusculo pallida; sutura mediocris; anfr. vix 4 rapide accrescentes, vix convexiusculi, ultimus peripheria subangulatus, basi planus, antice descendens; apertura perobliqua, angusta, oblonga, intus cœrulescens, nitida; perist. album, fusco-limbatum, late expansum, incrassato-reflexum, marginibus subparallelis, callo crasso junctis, columellari calloso, perdilatato, plano, introrsum dente transverso usque ad marginem dextrum producto, munito.

" Diam. maj. 55, min. 40, alt. 35 mill." (*Pfeiffer.*)

Hab. Ceylon (*Nevill, Gardener*).

This handsome species may readily be separated from *hæmastoma, phœnix, fastosus*, and *prosperus* by the more pronounced angulation of the periphery. The back of the body-whorl is provided with some obliquely descending malleations, a feature lacking in the other species, and the columellar plate is also broader in most specimens. In some the lip, which varies from light or dark brown to deep rose, is white on the inner edge, while I possess two specimens from the H. Nevill collection with a pure white lip; these two shells are, moreover, remarkable in not being unicolorous, the earlier whorls and the first two-thirds of the last whorl exhibiting dark brown bands on a light ground, regresented by the formula 0 2 3(4 5), all these bands becoming confluent on the latter portion of the last whorl.

Var. **grevillei**, *Pfeiffer.*

Helix grevillei, Pfeiffer, P. Z. S. 1856, p. 387, pl. 36, fig. 8; ibid., Novit. Conch. ser. 1, i, 1858, p. 108, pl. 30, figs. 6, 7; Hanley & Theobald, Conch. Ind. 1875, pl. 127, fig. 7.
Helix (Acavus) grevillii, Martens, Die Heliceen, ed. 2, 1860, p. 172; Nevill, Hand List, i, 1878, p. 80.
Helix (Macroön (Acavus)) superba, var. *grevillei*, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 82, pl. 12, figs. 47, 48.

The peristome, parietal callus, and columellar plate are blackish brown in most specimens, but in a shell from the H. Nevill collection they are jet-black, the shell itself being greyish-black. In other respects this form cannot be separated from typical *A. superbus*.

Var. roseolabiata, *Nevill.*

Helix superba, Hanley & Theobald, Conch. Ind. 1875, pl. 127, fig. 4.
Helix (Acavus) superba, var. *roseolabiata*, Nevill, J. A. S. B. l, 1881, p. 134.
Helix (Macroön (Acavus)) superba, var. *roseolabiata*, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 82, pl. 16, figs. 1, 2.

Like the last it can only be separated from typical *A. superbus* by the colour of the lip, which varies from pale to a brilliant deep rose.

65. Acavus waltoni, *Reeve.*

Helix valtoni, Reeve, P. Z. S. 1842, p. 49; ibid., Conch. System. ii, 1842, pl. 166, fig. 23.
Helix waltoni, Pfeiffer, Mon. Helic. Viv. i, 1847, p. 19; Férussac, Hist. Nat. Moll. p. 303, pl. 93, figs. 1, 2; Reeve, Conch. Icon. vii, 1852, pl. 72, fig. 372; Pfeiffer, Conch.-Cab., Heliceen, ii, 1853, p. 267, pl. 121, figs. 1–3; Chenu, Man. Conchyl. i, 1859, p. 453, figs. 3383, 3385; Figuier, Vie & Mœurs des Anim. 1866, p. 385, figs. 204, 205; Hanley & Theobald, Conch. Ind. 1875, pl. 127, fig. 1; Sarasin, Ergebn. Naturw. Forsch. Ceylon, 1, heft 2, 1888 pp. 35–69, pl. 6–8 (embryology).
Helix (Acavus) waltoni, Albers, Die Heliceen, 1850, p. 109; Nevill, Hand List, i, 1878, p. 81; Cooke, Cambr. Nat. Hist. iii, 1895, p. 304, fig. 204.
Oligospira waltoni, Ancey, Conch. Exch. ii, 1887, p. 22.
Helix (Macroön (Acavus)) waltoni, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 83, pl. 18, figs. 20, 21.
Acavella waltoni, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 288.
Acavus valtoni, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 154.
Acavus waltoni, Randles, Proc. Malac. Soc. London, iv, 1900, p. 103, pl. 9, figs. 6 (radula), 10, 15 (anatomy).

Original description:—"Hel. testa ovata, depressa, anfractibus ventricosiusculis, ultimo superne productiore, rubido-fusca, radiis longitudinalibus obsolete picta; epidermide tenui, peculiariter maculosa, induta; apertura subquadrato-ovali, marginibus nigerrimis disjunctis; labro acutissime reflexo." (*Reeve.*)

Major diam. 48–59, minor 32–39 mm., alt. 30–31·5 mm.

Hab. Ceylon.

The hydrophanous patches of the periostracum are very characteristic of the species and, while being almost obsolete in some specimens, form definite patterns in others; in one specimen in my collection they are disposed in spiral bands, in another they form obliquely descending patches above and spiral bands below the periphery, while in a third shell they are so crowded as practically to cover nearly the whole of the surface. The peristome and parietal band vary from a deep blackish to light purplish brown. The sculpture also varies considerably; the earlier whorls have the transverse striæ cut into granules by the incised spirals, a feature which in some shells is equally pronounced on the body-whorl, but in others becomes almost

obsolete; in some the body-whorl is more or less malleated in places, in others it is covered with spiral furrows.

Var. polei, *Collett.*

Acavus (*Oligospira*) *poleii*, Collett, J. Ceylon Br. R. A. S. xv, 1899, p. 153, figs. A, B (shell), C (egg).
Acavus polei, Randles, Proc. Malac. Soc. London, iv, 1900, p. 105, pl. 9, figs. 7, 11, 16 (anatomy).

Hab. Ceylon: Udagama (*Pole*).

The only character differentiating this form from *A. waltoni* appears to be the white peristome and parietal callus. Some anatomical differences are indicated by Mr. Randles, but I doubt these being of sufficient diagnostic value.

66. Acavus skinneri, *Reeve.*

Helix skinneri, Reeve, Conch. Icon. vii, 1854, pl. 197, fig. 1387; Hanley & Theobald, Conch. Ind. 1875, pl. 111, fig. 1; Dohrn, Conch. Cab., Heliceen, iv, 1881, p. 601, pl. 175, figs. 13, 14; Semper, Reisen Arch. Philippinen, Wiss. Res. 2, iii, 1870, p. 100, pl. 12, fig. 7 (anatomy), pl. 16, fig. 5 (radula).
Helix (*Acavus*) *skinneri*, Pfeiffer, Malak. Blätt. ii, 1856, p. 144; Nevill, Hand List, i, 1878, p. 81.
Acavus skinneri, Frauenfeld, Verh. K.-K. zool.-bot. Ges. xix, 1869, p. 876; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 154, pl. 50, figs. 1, 8, 26 (anatomy, etc.); Randles, Proc. Malac. Soc. London, iv, 1900, p. 103, pl. 9, fig. 5 (anatomy).
Oligospira skinneri, Ancey, Conch. Exch. ii, 1887, p. 22.
Helix (*Macroön* (*Acavus*)), Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 84, pl. 18, figs. 17–19.
Acavella skinneri, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 288.

Original description:—"Shell subglobosely depressed, thick, solid, very obliquely produced towards the aperture, everywhere minutely granulated, spirally broadly superficially grooved, livid chestnut, spirally freckled with a fulvous epidermis, disposed in hieroglyphic spots; spire short, rose-colour beneath, small; suture impressed; whorls three to four, last whorl very much the largest; aperture subquadrately oblong, lip externally broadly thickened, interiorly densely callous, continuous over the body-whorl, everywhere deep purple-violet." (*Reeve.*)

Major diam. 31–38, min. 22–26 mm.; alt. 17–22 mm.

Hab. Ceylon (*Skinner*); Upper Onavah (*Layard*).

The species is characterized by the callous growth on the outside of the peristome, evidently formed by the accumulation of the reflexed portion of the lip. In a specimen in my collection this growth measures 8 mm. in width. The numerous spiral ridges on the body-whorl appear to be a constant character. The earlier whorls have the same decussating incised spirals as in *A. waltoni*, but the body-whorl is very finely and regularly granulated, the granules being arranged in quincunx.

Subfamily CORILLINÆ.

Genus CORILLA, *Adams.*

Corilla, Adams, Gen. Rec. Moll. ii, 1855, p. 208; Semper, Reisen Arch. Philippinen, Wiss. Res. 2, iii, 1870, p. 100 (anatomy); Pilsbry, Man. Conch., ser. 2, ix, 1894, p. 147 (anatomy); Gude, Science Gossip, N. S. iii, 1896, pp. 88, 126 (armature); Pilsbry, Proc. Mal. Soc. London, vi, 1905, p. 288 (anatomy); Godwin-Austen, Moll. India, ii, 1907, p. 199 (anatomy).
Atopa, Albers, Die Heliceen, 1850, p. 90 (in part).

"*Shell planorboid, with nearly plane spire and broadly open umbilicus*, the contour subcircular or oblong; rather solid, striated above, brown or yellow. Whorls 5–5½, the last deflected in front. Aperture oblique, *the lip broadly reflexed or recurved*, its ends distant; parietal wall smooth or armed with a strong entering lamella. Interior of the last whorl either without laminæ or obstructed by *a series of blades nearly parallel to the direction of the whorls, but having no transverse barriers.*

"Foot (of *C. erronea*) with undivided sole and without pedal grooves. No mantle lappets. Kidney very short.

"Jaw entirely smooth. Radula with about 79–85 teeth in a transverse row. Central tooth not smaller than the laterals, having a single cusp, shorter than the basal plate. Laterals similar but asymmetrical. Marginals having a large, simple, oblique cusp longer than the square basal plate.

"Genital system elongated, with no accessory organs on the female side. Spermatheca having a long duct, which branches into *a very long flagellum-like diverticulum*, containing a cylindrical spermatophore, which extended from the end of the diverticulum to the vagina. Penis short, swollen distally, continued in the vas deferens upon which the penis retractor is situated, *the distal end of the retractor being inserted on the uterus.* This species [*C. erronea*] is ovoviviparous, the uterus in the individual figured containing two young, having a membranous shell of about 5 mill. diam., and more than 3 whorls.

"The shell differs from that of *Plectopylis* in lacking internal barriers transversely obstructing the passage. When internal lamellæ are present in *Corilla* they run parallel to the sutures or nearly so, as in *Polygyratia.* The central teeth are not smaller than the laterals as in *Plectopylis*, and there are further differences in the genitalia." (*Pilsbry.*)

TYPE, *Helix erronea*, Albers.

Range. Ceylon; Southern India (1 species).

When examining the soft parts of *Corilla humberti* in 1905, Prof. Pilsbry found that the additional data obtained threw no light upon the affinities of the groups with other Helicidæ. He further states that the suspicion he formerly entertained that *Corilla* might be related to the Macroögona is negatived by the knowledge we now

have of the lungs of both groups; and that we do not yet know enough of the anatomy of *Plectopylis*, *Stegodera*, or *Traumatophora*, to demonstrate any relationship between them and *Corilla*, though it is natural to suppose that these genera stand together. The genus, so far as we now know, stands by itself, he says, and for it alone a subfamily Corillinæ must be erected, which for the present might be placed next to the Camæninæ.

Lt.-Col. Godwin-Austen, on the other hand, considers that the generative organs in *Corilla* are remarkably similar to those of *Plectopylis*, while another striking character common to both genera is found in the liver.

Albers in 1850 established the genus *Atopa* for the reception of three species previously classed in *Helix*, i. e. *achatina*, Gray, *refuga*, Gould, and *rivolii*, Desh. The name being preoccupied in Coleoptera (Fabricius, in Paykull, Faun. Suec. ii, 1799, p. 116), H. and A. Adams in 1855 proposed *Corilla* in lieu, adding a fourth species, *erronea*, Alb. No type was indicated, but the first of the species enumerated being *achatina*, the name *Corilla* would, under a strict application of the law of priority, have to be assigned to *Helix achatina* and its allies, while *Plectopylis* would become a synonym. No useful purpose, however, would be served by such a process; on the contrary, much confusion would arise, and it therefore appears advisable to accept the status of these two genera as defined by Benson and Pilsbry.

The genus *Corilla* is especially remarkable from the fact that the immature shells are provided with barriers which invariably differ from those found in full-grown ones. The parietal folds are not formed until the shell approaches completion, while the palatal lamellæ of immature shells are always much larger, being almost triangular, overlapping, and reaching nearly to the parietal wall. From what we know of the retention of ancestral characters in young individuals, as explained by Darwin ('Origin of Species,' sixth edition, p. 388), it may, I think, safely be assumed that the immature form of barriers found in the young shells represents the form of lamellæ which were possessed by the progenitors from which the existing armed members of the genus have sprung. Consequently, those species which have to some extent retained such characters in the adult stage (i. e. *Corilla anax* and *C. beddomeæ*) are the older forms; while those species which have diverged most in the adult state (*i. e.* the group of *C. erronea*) are of more recent origin. A singular fact in this connection is that whereas in the adult state *C. adamsi* possesses no armature, immature shells are provided with five palatal lamellæ, the same as obtains in the other members of the genus. When publishing my observations on the armature of the various species of *Corilla* in 1896 I was ignorant of this fact and I am not aware that this has ever been pointed out. Among a number of shells in various stages of growth, sent to me by the late O. Collett, were several young specimens of *C. adamsi*, and upon opening these I discovered that they were furnished with palatal lamellæ similar

in shape and size to those previously observed in the other species. One specimen having completed nearly three whorls was provided with these barriers at the beginning of the third (post-embryonic) whorl. The natural inference is therefore that these lamellæ are formed almost immediately after the young animal is born.

That structures of this nature serve as a means of defence against the attacks of carnivorous insects and similar creatures was suggested as long ago as 1829 by Guilding, who, in speaking of the teeth and laminæ of the Pupidæ, observed that "they may answer the purpose of an operculum to keep out enemies, while they afford no obstacle to the motions of the soft and yielding body of the animal" (Zool. Journ. iv, 1829, p. 168, footnote). Of much interest in this connection is a note by Lt.-Col. Godwin-Austin, who, in a paper on the genus *Plectopylis*, states that "when breaking up a number of shells to expose the barriers and ascertain if their characters were constant, I was greatly interested to find in two instances the presence of small insects that had become fixed between the teeth." He further remarks that those shells posssessing such bars to the predatory visits of insects, such as certain kinds of beetles, ants, or even leeches, all of which swarm in the forests where the shells are found, would have the best chance of surviving (Proc. Zool. Soc. 1874, p. 611).

A careful examination of a number of immature shells, moreover, has revealed the fact that a new set of palatal lamellæ is formed on the completion of each half of a whorl, after which the previous set is absorbed by the animal. I have observed several specimens which contained two sets of barriers at a distance of half a whorl; in some cases the older set had almost vanished, only the foundations of the lamellæ being visible from the outside through the shell-wall.

The fact that *C. adamsi* upon reaching maturity dispenses with armature gives some scope for speculation. Without being acquainted with the local conditions it is of course impossible to solve the problem, but it may be surmised that the absence of predatory insects may have produced this result and that the formation of barriers in the immature shells is simply the survival of an ancestral character.

Key to the Species.

A. Mature shell *without* internal folds.
- *a.* Shell larger, diameter 29 mm. . . . . *adamsi.*
- *b.* Shell smaller, diameter 22 mm. . . . . v. *hinidunensis.*

B. Shell *with* internal folds.
- *a.* Palatal folds oblique.
  - *α.* Two parietal folds . . . . *beddomeæ.*
  - *β.* Three parietal folds . . . . *anax.*
- *b.* Palatal folds horizontal.
  - *α.* One parietal fold . . . . *humberti.*
  - *β.* Two parietal folds . . . . *odontophora.*

γ. Three parietal folds.
  *. Shell elliptic, palatal folds short, second scarcely curved.
    †. Lip much reflected.
      §. Two upper palatal folds terminating near the peristome .... *colletti.*
      §§. Palatal folds terminating further back .... *carabinata.*
    ††. Lip little reflected.
      §. Shell strongly and regularly ribbed . . *gudei.*
      §§. Shell more faintly and irregularly ribbed.
        1. Third palatal fold almost horizontal .... *erronea.*
        2. Folds very short, nearer aperture, third palatal fold very oblique, ascending.................... v. *erronella.*
  **. Shell rounded, palatal folds longer, second much curved .... *fryæ.*

67. **Corilla adamsi,** *nom. mut.*

Helix charpentieri, Pfeiffer, P. Z. S. 1853, p. 127 (non *Helix charpentieri*, Scholtz, Schlesien's Land- und Wasser-Moll. 1843, p. 28); Reeve, Conch. Icon. vii, 1854, pl. 185, fig. 1285; Hanley & Theobald, Conch. Ind. 1870, pl. 14, fig. 1; Brot, Journ. Conchyl. xii, 1864, p. 22, pl. 2, fig. 11.
Corilla charpentieri, Frauenfeld, Verh. K.-K. zool.-bot. Ges. xix, 1869, p. 876; Gude, Science Gossip, N. S. iii, 1896, p. 88, fig. 1.
Helix (*Corilla*) *charpentieri*, Nevill, Hand List, i, 1878, p. 70.
Helix (*Atopa*) *charpentieri*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 156, pl. 33, figs. 9, 10.

Original description :—" Testa umbilicata, discoidea, solidula, oblique costato-striata, parum nitida, virenti-cornea; spira regulari, plana; anfractibus $5\frac{1}{2}$, lente accrescentibus, modice convexis,

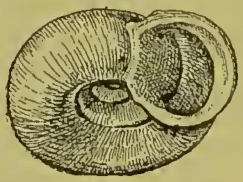

Fig. 12.—*Corilla adamsi.*

ultimo rotundato, antice profunde descendente; umbilico lato, conico, subirregulari; apertura fere horizontali, rotundato-lunari, intus albida, prorsus edentula; peristomate albo, undique late expanso et reflexo, marginibus convergentibus, infero ad insertionem attenuato." (*Pfeiffer.*)

Diam. maj. $27\frac{1}{2}$, min. 22, alt. 9 mill.

Hab. Ceylon (*Layard, Collett*); Nanu Oya jungle (*Preston*).

Among all the known species of *Corilla* the present one is

unique as being devoid of barriers in the mature shell. When publishing my series of articles on the Armature of Helicoid Land-shells in Science Gossip, N. S. vol. iii, 1896, *et seq.* I simply recorded that *Corilla charpentieri* [*C. adamsi*] was devoid of armature (*tom. cit.* p. 88). I was not then aware of the remarkable fact that this statement only applies to full-grown shells and that at earlier stages the species is furnished with palatal laminæ similar to those found in immature shells of the other species of *Corilla*, except that they are less oblique and consequently less overlapping. Among a number of shells I received in 1896 from the late O. Collett and subsequently from Mr. H. B. Preston, were several specimens of *Corilla adamsi* in various stages of growth, and upon opening some of the latter I was astonished to discover the palatal barriers. These occurred in specimens which had only four whorls, others possessed them where $4\frac{1}{2}$ whorls had been completed, while some had two sets of barriers, in one of which the earlier set had been partly absorbed.

Apart from the absence of barriers in mature shells, *Corilla adamsi* is readily distinguished from all its congeners by its more rounded outline, its higher axis, the regular and coarser ribs. In colour it varies from pale corneous to dark chestnut.

Owing to the fact that *Helix charpentieri* of Scholtz (1843) antedates Pfeiffer's name (1853) I have been reluctantly compelled to change the latter. I have associated with the species the name of the brothers Adams who proposed the name *Corilla*.

Var. **hinidunensis**, *Nevill.*

Corilla hinidunensis, Nevill, Enum. Helic. Pneum. Ceylon, 1871, p. 1.
Corilla charpentieri, var. *hinidunensis*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 148, pl. 41, figs. 23–25; Gude, Science Gossip, N. S. iii, 1896, p. 127, fig. 15.

Fig. 13.—*Corilla adamsi*, var. *hinidunensis.*

The late Col. Beddome favoured me with the loan of a specimen received from Nevill, for the purpose of illustration. This specimen is here reproduced. It measures 22 millim. in diameter.

68. **Corilla beddomeæ**, *Hanley.*

Helix (*Plectopylis*) *beddomeæ*, Hanley, Conch. Ind. 1875, p. 60 (no description), pl. 150, figs. 1, 2.
Plectopylis beddomei, Pilsbry, Man. Conch. ser. 2, ix, Index, 1895, p. 121.
Corilla beddomeæ, Gude, Science Gossip, N. S. iii, 1896, p. 127, figs. 13, 14.

Shell widely umbilicated, rotundate, discoid, somewhat thin, dark chestnut or blackish brown, irregularly costate, on the last whorl the costæ are intermingled here and there with obliquely descending wrinkles, dull above, shining below. Spire plane, suture a little impressed. Whorls $5\frac{1}{2}$–6, flattened above, tumid below, bluntly carinated above the periphery, a few traces of spiral sculpture on the lower surface; the last dilated towards the mouth, shortly and abruptly descending in front. Aperture oblique, almost subhorizontal, elliptic-ovate; peristome livid, thickened and reflected, upper margin nearly straight, outer curved, lower straight with a subquadrate callus, columellar very short, obliquely ascending; a slight ridge on the parietal callus connecting the margins of the peristome and giving off a long, sinuous, entering fold, ascending at first, the posterior extremity descending, below this occurs a shorter, free, flexuous, horizontal fold. Palatal folds 4, the first (upper) slightly ascending towards the aperture, and considerably attenuated anteriorly, the second

Fig. 14.—*Corilla beddomeæ* (type).

Fig. 15.—*Corilla beddomeæ*, small variety.

and third shorter, more elevated and more oblique, the fourth subparallel with the lower suture.

Major diam. 17·5–20, minor 14–16, alt. 6–6·5 mm.

Hab. Ceylon; Haycock Mountain (*Beddome*); Ambegamuwa, Watawala, Newara Eliya (*Collett*).

This shell was formerly extremely rare in collections, but the late O. Collett sent considerable numbers of it to England. Prof. Pilsbry, in referring the species to *Plectopylis*, was probably guided by its external characters. The absence of vertical or transverse barriers on the parietal wall, however, amply warrants its inclusion in *Corilla*. It differs in appearance from the other species, being wrinkled, thinner in texture, and much flattened above. Fig. 14 shows the type in the late Col. Beddome's collection. It measures 20 mm. in diameter. A small variety, from Watawala, in Mr. Ponsonby's collection, is shown in fig. 15. It is less coarsely wrinkled than the type, and is also paler and smaller, measuring only 16 mm. in diameter. Fig. 15 *e*, which

represents the shell with the outer wall removed, discloses the fact that only two parietal folds are present, corresponding to the median and lower folds of the species possessing three folds; both are visible from the aperture (see fig. 15 *b*). The median fold reaches to the parietal callus, and is long and irregularly flexuous, while the lower fold is very short. Of the four palatal lamellæ, the first and second only are visible from the aperture. The first, second, and third are broad, and ascend obliquely parallel to each other, while the fourth is smaller, narrower, and revolves horizontally, parallel with the lower suture. Fig. 15 *a* shows all six barriers from behind their inner terminations.

69. **Corilla anax**, *Benson.*

Helix anax, Benson, A. M. N. H. ser. 3, xv, 1865, p. 12; Hanley & Theobald, Conch. Ind. 1870, pl. 57, figs. 1–3.
Helix (*Corilla*) *anax*, Nevill, Hand List, i, 1878, p. 70.
Helix (*Atopa*) *anax*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 157, pl. 33, figs. 16–18.
Corilla anax, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 148; Gude, Science Gossip, N. S. iii, 1896, p. 126, fig. 12 (shell and armature).

Original description.—" H. testa late umbilicata, subovato discoidea, utrinque concava, solidula, superne oblique costulato-striata, subtus striata, nitidiuscula, fusco-castanea, subtus lætiore; spira immersa, apice elevatiuscula, sutura subprofunda; anfractibus 5, primis convexiusculis, ultimo convexo, antice descendente, dilatato, deflexo, ad diametrum minorem angustiore; apertura perobliqua, rotundato-oblonga, lamellis 2, parietalibus, albis, superiore longe intrante, sinuata, inferiore obliqua sinuata, breviore, ab apertura remotiuscula, palatalibus 3, longiusculis, subprofundis obliquis parallelis ab apertura conspicuis extus perlucentibus coarctata; peristomate cæruleo-albido, subcallosa, breviter reflexiusculo, marginibus callo albido junctis, inferiore subdentato-incrassata.

" Diam. maj. 23, min. $17\frac{1}{2}$, axis 8 mill., apertura lata vix 10, longa 9 mill." (*Benson.*)

Hab. India: Travancore; Anamullay Hills (*Beddome*).

This is the only species of *Corilla* known to occur outside Ceylon, being found in the southern part of India. It is of a dark chocolate colour, and possesses three parietal and four palatal plates. Fig. 16 *a* shows the entire shell, four of the plates—two parietal and two palatal—being visible from the aperture. The parietal plates are much broader than in the other species, the first curves upwards, while the second reaches as far as the parietal callus; but, unlike those of the other species, they are separate. The third parietal plate is almost horizontal, with but a slight curve, as will be seen on reference to fig. 16 *c*, the specimen being there figured with the outer wall removed. Fig. 16 *d* shows the same shell with part of the outer wall broken away, and the plates are shown as they appear from behind their inner terminations. The

palatal plates also are seen to be much broader than in the other species, and the three upper ones are much more oblique, resembling in this respect the immature plates found by me in three of the other species. In fig. 16 *e* a portion of the last whorl is drawn, in which the palatal plates nos. 1, 2, and 3 are shown as they appear through the shell, while fig. 16 *b* shows the entire shell from below with palatal plates nos. 3 and 4 shining through. The late Col. Beddome lent me several adult examples of this species for examination, one of which is of interest from the fact that it exhibits, in addition to the mature armature, immature plates which are identical in form and position with those I found in an adult shell of *Corilla odontophora*. With these adult examples was an immature shell with three whorls completed,

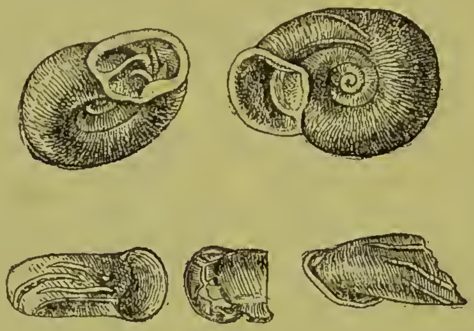

Fig. 16.—*Corilla anax.*

which is specially noteworthy in that it possesses two sets of immature plates, one near the end of the third whorl, and the other a little beyond the place where $2\frac{1}{2}$ whorls have been completed. It may therefore safely be inferred that the plates are not absorbed till after completion of the new ones, and it will be remembered that this is not an isolated case, for two sets of plates have been observed by me in a full-grown specimen of *Corilla odontophora*, and Col. Beddome lent me a shell of this last-named species, identical in this respect. He informed me that he collected his specimens of *Corilla anax* in the Anamullay Hills, in the Coimbatore District of South India, in moist woods, at 2000 feet elevation, where it was very abundant on and under dead logs.

The specimen shown in fig. 16 is in Mr. Ponsonby's collection.

70. **Corilla gudei**, *Sykes.*

Corilla gudei, Sykes, Proc. Malac. Soc. London, ii, 1897, p. 234, pl. 16, figs. 8–10; Godwin-Austen, Moll. India, ii, 1907, p. 199, pl. 114, fig. 3 (anatomy).

Original description:—"Size and shape similar to those of

C. erronea; the last whorl, however, more descending and more contracted at the spot where the lamellæ show most conspicuously through the shell. Sculpture nearly as strongly marked on the lower as on the upper surface; *C. gudei* differing thereby from all other known Ceylon forms akin to it and recalling the Indian *C. anax*. Outer lip slightly more reflexed than in *C. erronea*; the mouth not so drawn out and slightly more rounded. Palatal and parietal lamellæ the same in number as in *C. erronea*, but somewhat shorter; differing also in situation by being more nearly parallel, especially (counting from above) the second and third palatal ones. Umbilical area more impressed in the present species. Colour a little lighter than in *C. erronea*; a few specimens have a rosy tint.

"Long. 23–22, lat. 16–17, alt. 7–6·5 mm." (*Sykes.*)

Hab. Ceylon: Karunegala (*Collett*).

"As compared with *C. anax*, the present species differs in having one whorl more, the whorls being more flattened above, the lip more reflected, and the last whorl not so inflated or produced." (*Sykes.*)

In addition to the differentiating features referred to by Mr. Sykes, *C. gudei*, in spite of the fact that it possesses nearly a whole whorl more than *C. anax*, is about 5 mm. shorter in its major diameter, the ribs are a little coarser and more widely spaced, and the mouth is much less dilated transversely. The second and third palatal lamellæ, moreover, are much less oblique and nearer the aperture.

A number of immature shells of various sizes, received from the late O. Collett, possess the immature barriers, similar to those observed by me in all the other species of *Corilla*. One specimen has nearly three whorls completed and is provided with the usual five palatal lamellæ about one-quarter of a whorl beyond the post-embryonic whorl.

71. Corilla humberti, *Brot.*

Helix humberti, Brot, Journ. Conchyl. xii, 1864, p. 21, pl. 2, figs. 5, 6; Hanley & Theobald, Conch. Ind. 1876, pl. 159, fig. 9.
Helix (*Corilla*) *humberti*, Nevill, Hand List, i, 1878, p. 70.
Helix (*Atopa*) *humberti*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 156, pl. 33, figs. 22, 23.
Corilla humberti, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 148; Gude, Science Gossip, N. s. iii, 1896, p. 92, fig. 11 (shell and armature); Pilsbry, Proc. Malac. Soc. London, vi, 1905, p. 288, pl. 13, figs. 1–3, pl. 14, figs. 10–12 (anatomy).

Original description:—"T. late et profunde umbilicata, discoidea, subirregularis, solidula, superne costulato-striata, subtus vix striatula, nitida, unicolor olivaceo-fusca; spira plana. Anfr. 5 vix convexiusculi, ultimus antice descendens. Apertura obliqua, obtuse cordata, lamella una parietali, centrali, valida, sinuata et palatali una profunda, brevi (extus haud conspicua) coarctata.

Peristoma dilute olivacco-fuscum, callosum, brevissime reflexum; marginibus callo elevato junctis, supero subdentato, infero dente quadrato munito.

"Diam. maj. 25, min. 20, alt. 9 mill." (*Brot.*)

Hab. Ceylon (*Humbert, Collett*); Newara Eliya and Watawala (*Preston*).

Differs from all other species of *Corilla*, except *charpentieri* and *beddomeæ*, in being more rounded in outline. From the former it is easily distinguished by its smaller size and in being a trifle more excentric, while from the latter it may readily be separated by the rounded whorls. In colour it varies from blackish brown to olivaceous corneous. Nevill * threw some doubt on the correctness of Brot's figure of the species. When studying these

Fig. 17.—*Corilla humberti.*

shells in 1896, I applied to Dr. Brot for the loan of his type and he was good enough to comply with my request. I was thereby enabled to confirm Benson's conjecture that the original figure was slightly misleading, as the basal palatal fold appeared to be joined to the suture, owing to the position in which the shell had been placed, but on tilting it from the left side, the fold was found to be quite unconnected with the suture, and I was therefore in a position to give a more correct figure, which is now reproduced. This fold corresponds with the fourth in the other species, while the parietal fold corresponds with the second of the others. An examination of several specimens received subsequently from the late O. Collett and from Mr. Preston, has, however, revealed the fact that the palatal fold is by no means a constant feature, for these specimens, without exception, are devoid of all palatal folds. A few exhibit traces (visible from without) of an immature set of oblique folds on the penultimate whorl, but the folds themselves have been absorbed.

72. Corilla odontophora, *Benson.*

Helix (Corilla) odontophora, Benson, A. M. N. H. ser. 3, xv, 1865, p. 175; Nevill, Hand List, i, 1878, p. 70.

Helix odontophora, Hanley & Theobald, Conch. Ind. 1870, pl. 57, figs. 4–6.

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* A. M. N. H. ser. 7, xvi, 1865, p. 175.

Helix (Atopa) odontophora, Tryon, Man. Conch. ser. 2, iii, 1887, p. 157, pl. 33, figs. 24–26.
Corilla odontophora, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 148; Gude, Science Gossip, N. S. iii, 1896, p. 91, fig. 10 (shell and armature).

Original description :—" H. testa late umbilicata, rotundato- vel ovato-discoidea, solidula, castanea vel rufescenti-lutea, superne subplanulata, oblique tenuiter costulato-striata, subtus valde concava, striata, nitida; spira planiuscula, versus apicem obtusum elevatiore, sutura impressa; anfractibus 4, primis convexiusculis, ultimo antice convexiore, tum descendeute, dilatato-deflexo, subtus valde inflato; apertura perobliqua, obtuse subcordata, lamellis 2 parietalibus (superiore longe intrante curvata, inferiore subparallela, breviore, subcurvata, ab apertura remotiuscula), palatalibus 4 brevibus semiluuaribus vel sinuatis (omnibus integris ab apertura conspicuis, extus perlucentibus) coarctata; peristomate purpurascenti-albido vel castaneo, calloso, breviter reflexo, marginibus superiore et inferiore subdentato-incrassatis.

"Diam. maj. 22–26, min. 17–19, alt. 7–8 mill." (*Benson.*)

Hab. Ceylon: Fort McDonald (*Layard*); Uda Pussellawa (*Preston*).

The figure given of *C. odontophora* in Conch. Ind. pl. 57, fig. 4, and copied in Tryon's work, pl. 33, fig. 24, is somewhat misleading, as it evideutly represents an immature specimen, although no reference is made to this fact. The figures now reproduced illustrate a specimen in Mr. Ponsonby's collection. On reference to fig. 18 *b* it will be seen that only two parietal folds are

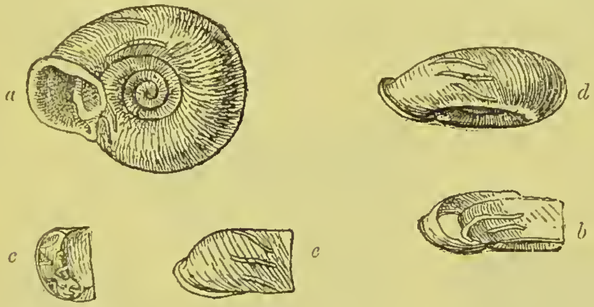


Fig. 18.—*Corilla odontophora.*

present. Fig. 18 *c* exhibits the barriers as seen from behind their inner terminations, and it will be observed that there are four palatal folds, the upper three (visible through the shell-wall) are shown in figs. 18 *d* aud 18 *e*, while fig. 18 *a* exhibits the underside of the shell with the third and fourth folds showing through. They are much shorter and less flexuous than in either *C. erronea* or *C. fryæ* aud, as stated by Benson, are entirely visible from the aperture. Another point to be noted is that the outer terminations (*i. e.* nearest the aperture) of the upper three palatal folds

form an oblique line parallel with the peristome, the first one being nearest the aperture, whereas in *C. erronea* and *C. fryæ* they form a semi-circle, the second fold being nearest the aperture. The shell of *C. odontophora* is more regularly and less coarsely ribbed than that of *C. erronea*, and is larger, although composed of only from 4 to 4½ whorls, while the other two species possess 5 whorls. It further differs from *C. erronea* in that the last whorl is more deflected in front, more tumid, and then suddenly contracted behind the peristome, more resembling *C. fryæ* in these respects, as also in the presence of a quadrate tooth on the basal margin of the peristome. This specimen, moreover, although adult, exhibits the immature form of palatal folds (see fig. 18 *a*) immediately behind the callus of the mouth; the folds themselves, however, have already been absorbed.

73. **Corilla fryæ**, *Gude.*

Corilla fryæ, Gude, Science Gossip, N. S. iii, 1896, p. 89, figs. 2, 4, 5, 6.

Original description:—"Testa late umbilicata, ovato-rotundata, discoidea, solidula, rufo-castanea, planulata, oblique costulata, subtus valde concava, striata, pernitida; spira plana, sutura vix impressa. Anfr. 5, vix convexiusculi, inter suturam et peripheriam valde angulati, ultimus subtus ornatur striis spiralibus quæ secundum latus lineis vel rugis impressis obliquis decussantur; antice convexior, valde dilatatus, profunde descendens. Apertura obliqua, obtuse subcordata, lamellis 3 parietales (media elongata, validaque, laterales minores, profundæque). 4 palatales flexuosæ, longulæ, perlucentes, 3 ab apertura visibiles. Peristoma exalbido purpurescens, vel rufo-castaneus, callosum valde reflexum, margo superior sub-dentate crassior, inferior dente valido atquæ quadrato armatur.

"Diam. maj. 26, min. 20, alt. 8 mm." (*Gude.*)

Hab. Ceylon: Albion Estate, Lindula Districts (*Mrs. Fry*); Ambegamuwa (*Collett*).

Fig. 19.—*Corilla fryæ.*

Corilla fryæ differs from *C. erronea* in being more rounded in outline, larger, darker in colour and more shining beneath, the ribs are more regular and less coarse; the whorls are less convex, almost flattened and distinctly angulated, almost keeled, midway between the suture and the periphery, while the suture is less

impressed; the last whorl is more constricted, and suddenly widens towards the aperture, becoming again constricted behind the peristome, and it is more deeply deflected in front; the mouth is much less oblique, the palatal folds are longer and more flexuous, and the tooth on the basal edge of the peristome is longer and more quadrate; in this latter respect, as well as in contour and shape, it more resembles *C. odontophora*. [Fig. 20 *b* shows the barriers from behind, a piece of the shell-wall having been broken away.] A reference to fig. 20 *a*, which exhibits the parietal folds, will explain why the upper fold is invisible from the aperture, being hidden by the median fold with which it unites about the middle. Figs. 19 *b* and 19 *c* show that the palatal folds are distinctly visible through the shell-wall. The specimens delineated in figs. 19, 20, and 21 are all mature and being composed of five whorls, it follows that the barriers are placed near the end of the fifth whorl. In fig. 20 *c* the second palatal fold is shown by itself, the upper convex line indicating its attachment to the shell-wall.

a *b* *c*

Fig. 20.—*Corilla fryæ.*

An immature specimen was found to contain five palatal plates in the fourth whorl, the upper four being much broader and more elevated than those in mature shells, reaching nearly to the inner wall; they overlap, being placed close together, slanting obliquely

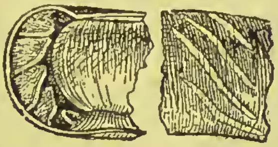


Fig. 21.—*Corilla fryæ*, immature, × 2.

upwards, but scarcely curving; the fifth (lowest) is very short and narrow and corresponds in position to the fourth fold in the full-grown shells. Fig. 21 shows the four upper plates as seen through the shell-wall. A still younger shell received from the late Mr. Collett possessed a set of these immature barriers at the beginning of the third whorl, a short distance from the nepionic part of the shell, demonstrating that the animal begins to form these structures almost directly after being hatched.

74. Corilla erronea, *Albers.*

Helix rivoli, Pfeiffer (non Deshayes), Mon. Helic. Viv. i, 1848, p. 407; Reeve, Conch. Icon. vii, 1852, pl. 78, fig. 413; Pfeiffer, Conch.-Cab., Heliceen, ii, 1852, p. 238, pl. 112, figs. 16-19; iii, 1853, pl. 160, figs. 8-11, 14, 15.

Helix erronea, Albers, Zeits. Malak. x, 1853, p. 107; Kobelt, Illust. Conch. Buch, 1879, pl. 68, fig. 37; Brot, Journ. Conchyl. xii, 1864, pl. 2, figs. 7-9.

Anchistoma (*Corilla*) *erroneum*, Adams, Gen. Rec. Moll. ii, 1855, p. 208.

Corilla erronea, Frauenfeld, Verh. K. K. zool.-bot. Ges. xix, 1869, p. 876; Semper, Reisen Arch. Philippinen, Wiss. Res. 2, iii, 1870, p. 100, pl. 12, fig. 18, pl. 16, fig. 4 (anatomy); Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 148, pl. 41, fig. 19 (armature), pl. 42, figs. 37, 38 (anatomy); Gude, Science Gossip, N. S. iii, 1896, p. 89, fig. 3, p. 90, fig. 7 (shell and armature).

Helix (*Corilla*) *erronea*, Nevill, Hand List, i, 1878, p. 70.

Helix (*Atopa*) *erronea*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 157, pl. 33, figs. 19-21.

Original description:—"Testa latissime umbilicata, oblongo-discoidea, superne plana, irregulariter costulato-striata, fusca, basi lævigata, fusco-olivacea, nitidissima; anfractus 5, ultimus in latere testæ sinistro angustatus, antice dilatatus, paululum descendens; apertura obliqua, obtuse obcordata, intus margaritacea, 4-lamellata; lamellis tribus in pariete aperturali, media valida, prominens, laterales breviores, profundæ, lamella palatalis singula profunda, interstitio inter lamellam ventralem mediam et sinistram opposita; peristoma callosum, breviter reflexum, marginibus callo mediocri cum lamina ventrali media coufluente, junctis, basali callo oblongo, dentiformi incrassato.

"Diam. maj. 15, min. 18, alt. 7 millim." (*Albers.*)

Hab. Ceylon: Newara-Eliya (*Nevill, Blanford*).

Fig. 22.—*Corilla fryæ.*

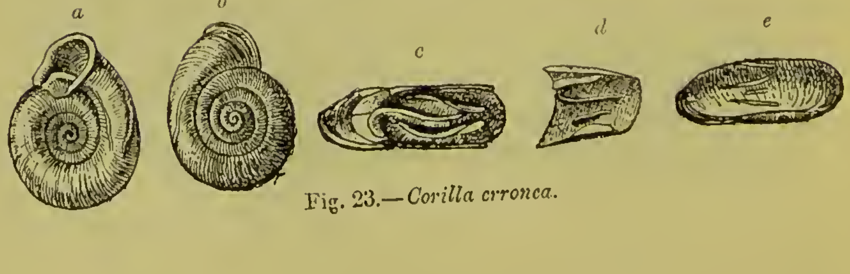


Fig. 23.—*Corilla erronea.*

The palatal plates are disposed in much the same manner as in *C. fryæ*, but they are shorter and less curved (see fig. 23 *d*), which shows a portion of the inner side of the outer wall with the palatal plates *in situ*. The parietal folds are almost identical in shape and position with those in *fryæ* (see fig. 23 *e*) but they are shorter and the union of the first and second (upper and median) folds is not so complete. The specimen shown in fig. 23 *e* is of interest on account of a small adventitious denticle between the second and third folds.

Var. **erronella**, *Gude*.

Corilla erronea, var. *erronella*, Gude, Science Gossip, N. S. iii, 1896, p. 127, fig. 16.

Much smaller and thinner than *C. erronea*, and the palatal lamellæ much shorter and placed much nearer the mouth of the shell. The outer terminations of the parietal folds and the whole of the thin upper palatal lamellæ are visible from the aperture (see fig. 24 *a*). The third palatal lamella, which in *C. erronea* is

Fig. 24.—*Corilla erronea*, var. *erronella*.

nearly horizontal, is here strongly oblique and ascending, while the fourth reaches nearly to the peristome (see fig. 24 *c*). Known from a unique specimen in the late Col. Beddome's collection. He received it with the MS. name *C. erronella*, Nevill.

75. **Corilla carabinata**, *Férussac*.

Helicodonta carabinata, Férussac, Tabl. Syst. Limaçons, 1821, p. 38, n. 109.

Helix carabinata, Férussac, Hist. Nat. Moll., Expl. Planches, 1822, p. iii, pl. 51 B, fig. 3 (shell and armature); Bowdich, Elem. Conch. 1822, pl. 7, fig. 19; Deshayes, Anim. sans Vert. ed. 2, viii, 1838; Delessert, Rec. Coq. 1841, pl. 26, fig. 8; Guerin, Icon. Règne Anim., Moll. 1844, pl. 6, fig. 5; Chenu, Ill. Conch. 1850, pl. 12, fig. 8.

Helix rivolii, Deshayes, Encycl. Méth., Vers, ii, 1830, p. 208; ibid. in Férussac, Hist. Nat. Moll. i, 1839, p. 7; Pfeiffer, Conch.-Cab., Heliceen, iii, 1853, p. 489, pl. 160, figs. 12, 13; Reeve, Conch. Icon. vii, 1854, pl. 185, fig. 1284; Chenu, Encycl. Hist. Nat., Moll. 1858, p. 133, figs. 7–9; Brot, Journ. Conchyl. xii, 1864, pl. 2, fig. 10; Hanley & Theobald, Conch. Ind. 1870, pl. 14, fig. 2.

Helix (*Atopa*) *rovolii*, err. typ., Albers, Die Heliceen, 1850, p. 90.

Anchistoma (*Atopa*) *rivolii*, Chenu, Man. Conchyl. i, 1860, p. 463, figs. 3452–54.

Helix (*Corilla*) *rivolii*, Nevill, Hand List, i, 1878, p. 70.

Corilla rivolii, Frauenfeld, Verh. K. K. zool.-bot. Ges. xix, 1869, p. 876; Tryon, Struct. Conch. iii, 1884, p. 33, pl. 94, fig. 24; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 148, pl. 41, figs. 20–22; Gude, Science Gossip, N. S. iii, 1896, p. 91, figs. 8, 9 (shell and armature).

Helix (*Atopa*) *rivolii*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 156, pl. 33, figs. 11, 12.

Original description:—"H. testa alba, vitrea, utroque latere concavo-planulata, ellipsoidea; spira irregulari, superne striata, inferne lævigata; anfractibus gyratis, ultimo majore, ad aperturam depressis; apertura dilatata, tubæformi obliqua, rotundato-semilunari, intus quinquedentata; dente collumellari alteris longiore."

Major diam. 23–25, minor 16·5–17, alt. 6·25–7 mm.

Hab. Ceylon (*Templeton*); Kandy (*Nevill*, *Preston*).

When describing *Helix rivolii* in 1830 Deshayes was probably unaware of the fact that the shell figured by Férussac as *Helix carabinata* was identical with his own. In 1838, however, when editing the second edition of Lamarck's 'Animaux sans Vertèbres,' he acknowledges Férussac's name and relegates *rivolii* to the synonymy, reversing the process when editing Férussac's Hist. Nat. Moll. (vol. i, p. 7, 1839), where he states that doubtless Férussac had provisionally so-named the species, and that he has searched the dictionaries in vain for the meaning of the word *carabinata*. For this reason he thought it advisable to retain for the species the name he had himself proposed for it in 1830. While a few of the older authors adopted Férussac's name, every one dealing with the species since 1850 has recognized Deshayes' designation. Although Férussac did not give a description and livraison x, containing plate 51 B (numbered 101 in some copies) on which the species is figured, had no text with it, two sheets of 'Explication des Planches' were issued with livraison xvi in 1822 *, on page iii of which the name *H. carabinata* duly occurs.

Under these circumstances Férussac's name must be adopted.

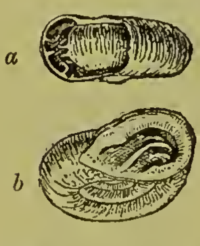


Fig. 25.—*Corilla carabinata.*

Fig. 26.—*Corilla carabinata* immature.

In fig. 25 *a* the parietal and palatal barriers are exposed from behind, while fig. 25 *b* shows the median parietal fold joining the callus at the aperture and the anterior terminations of the upper

* A copy of this is in my possession.

and lower folds. In fig. 26 two immature specimens are delineated, of which *a–e* exhibit one with four whorls completed, having five immature palatal plates. In fig. 26 *e* and *f* the dagger indicates the place where the barriers occur, in the former at the end of the fourth whorl and in the latter where only 3½ whorls have been completed. I also possess one specimen of 2¾ whorls which is provided with a set of barriers at the end of 2½ whorls, distant about ¼ whorl from the nepionic shell. Except in size these barriers do not differ from those in the other immature shells.

76. **Corilla colletti**, *Sykes.*

Corilla colletti, Sykes, Proc. Malac. Soc. London, ii, 1897, p. 233, pl. 16, figs. 11–13.

Original description:—"Shape strongly recalling that of *C. rivolii*, but the new species is much smaller in size. Sculpture also similar in nature, but finer and more closely set. The mouth in the present species not so much contracted and not quite so descending; the lip not nearly so reflexed and thickened. The palatal and parietal lamellæ are the same in number in both species, but in *C. colletti* the former approach more nearly to the lip, especially the upper two. Of the parietal lamellæ, the upper and lower are more nearly parallel, and not so convergent, while the middle one is much shorter than in *C. rivolii*, and does not enter so far into the shell.

"Long. 21–21·25, lat. 14–15·5, alt. 6–5·75 mm." (*Sykes.*)

Hab. Ceylon : Balangoda (*Collett*).

Genus **PLECTOPYLIS**, *Benson.*

Plectopylis (section of *Helix*), Benson, A. M. N. H. ser. 3, v, 1860, p. 244; Stoliczka, J. A. S. B. xl, 1871, p. 217; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 143; Gude, Science Gossip, N. S. vi, 1899, pp. 147, 174; Godwin-Austen, Moll. India, ii, 1907, p. 201.

Type, *Helix achatina* (Gray), Pfeiffer [*bensoni*, Gude].

Range. N.E. India, Burma, Tonkin, South and Central China, and Loo Choo Archipelago.

"*Shell depressed, with flat or low-conical spire and large umbilicus,* dextral or sinistral; solid or thin, the upper surface generally sculptured with spiral lines, hirsute in the young. Aperture half-round or lunate, oblique, the lip reflexed, its end generally joined by an elevated parietal callus, which usually bears an entering lamella. Interior of the last whorl *obstructed by a barrier composed of a transverse plate or plates on the parietal wall*, and several transverse or longitudinal denticles or plates on the outer wall.

"Foot short, rarely equalling in length the diameter of the

shell; tentacles very short, eye pedicles of moderate length. Mantle-edge thin, with small right and left body-lappets. Pulmonary cavity small. Kidney large, triangular.

"Jaw very thin, horny, arched, with a small anterior median projection; it is marked transversely with a great number of more or less distant grooves which divaricate in the centre. Radula of moderate width, long, composed of about 100 transverse more or less V-shaped rows of 60–70 teeth. *Central tooth smaller, sometimes much smaller, than the laterals*, very narrow, the reflection small, with three slender cusps. Lateral teeth with a large inner cusp and simple or bifid outer cusp, and a minute inner cusp.

"Genital system having the duct of the spermatheca long. An organ of unknown homology (either a dart sack, a diverticulum of the spermatheca, or an appendicula) enters the vagina just above the opening of the spermatheca duct. Uterus containing few large eggs. Penis simple, receiving the vas deferens and the penis retractor at its apex, the latter attached distally to the floor of the lung cavity." (*Pilsbry.*)

Stoliczka was the first to investigate the anatomy of *Plectopylis* (1871), four species, *achatina* [*bensoni*], *cyclaspis*, *pinacis*, and *macromphalus*, forming the subject of his memoir. It was not until thirty-six years subsequently (1907) that Lt.-Col. Godwin-Austen followed with an account of the anatomy of *P. cyclaspis*. Stoliczka states that on the whole the form of the body closely resembles that of *Clausilia*, and that a comparison of the interior organization of the two genera also indicate their close relation. The jaw he found similar in structure but different in shape. Much greater, he continues, is the similarity of the *Plectopylis* jaw to that of *Cylindrella*, with the exception that the median projection is wanting in the latter. The arrangement of the teeth of *P. achatina* [*bensoni*] and *P. cyclaspis* he also found to agree with that of *Cylindrella* in the very small size of the centre tooth, but this was not found to be a constant character. In *P. pinacis* the centre tooth was larger and more of a shape similar to that of the lateral teeth, which, however, in all the species he found to retain distinctly the helicoid character.

Godwin-Austen found in *P. cyclaspis* the penis simple, like that of *Corilla*, but very short in comparison with the great length of the rest of the genitalia and other organs occupying the closely-wound many-whorled shell. He states that the vagina soon develops into the thin-walled oviduct, which was found occupied by about a dozen embryonic shells in various stages of development, the anterior ones, very well grown, showed the coiled visceral sac, and were covered with minute calcareous granules. The spermatheca was a thin cord with a sac-like expansion at the free end. The hermaphrodite duct was long, convolute, and lying attached to the side of the albumen-gland.

The intestine was long and cord-like, the salivary glands small

and elongate, the heart situated one whole whorl behind the aperture, and lying below the oval-shaped kidney. The oviduct was packed close to the heart.

The jaw he found very thin and delicate, composed of 24 elongate plates which slightly overlap, the central plates being the largest. These plates were attached to a mass of muscular tissue, or, in other words, this muscular tissue merged into the more solid plates; in this respect there being a similarity to the jaw of *Succinea*; the resemblance to the jaw of *Thysanota guerini* being still greater.

The teeth of the radula are stated to be thus disposed:

12 . 9 . 1 . 9 . 12 or 21 . 1 . 21.

The centre tooth is stated to be small, on a narrow oblong plate; the plates of the admedian teeth nearly square, there being an indication of a duplication followed by fusing of parts, the square plate being divided into a long inner oblong portion and a shorter outer oblong portion with a well-defined rounded upper outer angle. At the 10th tooth the very long inner cusp of the 9th tooth he found to become bicuspid into blunt rounded points, the biscuspid form with a single small cusp outside it continuing to the outermost teeth. This type of radula, he notes, is peculiar to the genera *Thysanota*, *Sykesia* [*Ruthvenia*], and *Philalanka*, to a greater or less extent with modification of the central and admedian teeth.

Stoliczka raised *Plectopylis* to generic rank, but Prof. Pilsbry in 1890 made it a section of *Helix*. In 1894, however, he also accorded it generic status and in his Index to the Helicidæ, 1895, p. 124, it was placed between the groups Macroogona and Teleophallogona. He there included two Chinese groups of uncertain affinity—*Traumatophora* and *Stegodera*, each containing one species—but as nothing is known of their anatomy, and as, moreover, they are devoid of the armature characteristic of *Plectopylis*, their inclusion is hardly warranted.

In 1899 the present writer divided the genus into seven sections, one of which—*Sykesia* [*Ruthvenia*] has since been shown to have affinity with *Thysanota* and *Philalanka* and which has already been dealt with (*ante* p. 25). Another section—*Enteroplax*, proposed for the reception of three Philippine Island species—will probably share a similar fate when the soft parts come to be examined.

Benson had already noted that *Plectopylis achatina* [*bensoni*] was ovoviviparous, and this was found to be the case with all four species examined by Stoliczka. I have also observed this fact in a specimen of *P. lissochlamys*.

As regards the question concerning the probable primordial form from which the existing species have been evolved, this is very problematical, as no fossil forms are known. Stoliczka, it is true, described three species of fossil Helices, which he referred to the section *Anchistoma* [= *Gonostoma*], stating that they had affinity with *Plectopylis* and *Corilla* (Cretaceous

Fauna of Southern India, ii, 1868, p. 9 *et seq.*). Nevill, who examined these fossils, however, was of opinion that their appearance did not warrant this theory (J. A. S. B. l, 1881, p. 128).

It is likewise almost impossible to judge as to which of the known forms are the most archaic, since the armature of immature specimens, so far as they have come under my observation, throw no light on the subject, as they do in the case of *Corilla*; except in size and in the length of the folds, the barriers of mature and immature shells are almost identical. There is one exception in this respect, *i. e. Plectopylis woodthorpei*, in which the palatal folds of the anterior series are only found in mature specimens. It may, however, be assumed that the simple armatures preceded the more complicated structures, and on this assumption *P. bensoni* and its allies, with their complex parietal barriers, must be regarded as the most recent; while in another direction, *P. plectostoma* and its congeners, with their biserial palatal folds, have presumably been evolved from some monoserial predecessor, of which *P. sowerbyi* may be taken as a less modified representation.

The distribution of the genus is somewhat peculiar. The centre of distribution appears to be Lower Burma, especially Pegu and Tenasserim; while no species occur to the south-east, the whole of Siam and Cochin China being blanks. Going east the Burmese Shan States and Laos each possess one species, while Tonkin has a considerable number. Upper Burma contributes one species from the Bhamo district—*P. andersoni*, one from Munipur—*P. munipurensis*, and three species in the south—*perarcta*, *ponsonbyi*, and *woodthorpei*. Assam has fourteen species. Going west we find another blank tract until we reach Sikkim, the western limit of the genus, where there are five species. Eastern Thibet provides a single form, *P. alphonsi*, while Southern and Central China, including Hongkong, produce no less than seventeen species, and a single outlier occurs in the Loo Choo Islands.

Key to the Species.

I. Section Endothyra, *Gude.*
(Third Section of Benson.)

Sinistral. Umbilicus moderate. Palatal folds horizontal or oblique.

Type, *P. plectostoma.*

Range. Sikkim, Assam, Burma.

A. Palatal folds in one series.
- *a.* Shell 14–15 mm., horizontal fold below parietal plate .... *pinacis.*
- *b.* Shell not exceeding 9 mm., horizontal fold absent. *sowerbyi.*

B. Palatal folds in two series.
- *a.* Parietal plate without denticles................ *fultoni.*
- *b.* Parietal plate with one denticle posteriorly ...... *macromphalus.*
- *c.* Parietal plate with two denticles posteriorly.

a. Shell not exceeding 6 mm.
  * One upper and one basal palatal fold.
    † A short horizontal fold above parietal plate. *blanda.*
    †† Horizontal fold none .... *minor.*
  ** Only one basal palatal fold .... *hanleyi.*
β. Shell 8–10 mm.
  * Parietal plate gives off anteriorly a horizontal fold from upper extremity; one short horizontal fold below .... *plectostoma.*
  ** No horizontal fold proceeding from parietal plate; two short horizontal folds below .. *affinis.*

II. Section CHERSÆCIA, *Gude.*
(Second Section of Benson.)

Sinistral or dextral. Umbilicus wide. Palatal folds horizontal or oblique, sometimes with one oblique or vertical lamina.

TYPE, *P. leiophis.*

Range. From Assam through Upper Burma and Laos to Tenasserim.

1. *Dextral.*

A. Transverse parietal plate simple.
  a. Free horizontal parietal folds none.
    α. Palatal folds *six*.
      * Connected by a transverse ridge; shell 27 mm. *oglei.*
      ** Not connected; shell 24–26 mm. .... *andersoni.*
    β. Palatal folds *five*; shell 11 mm. .... *serica.*
    γ. Palatal folds *seven* with two denticles .... *laomontana.*
  b. A free interrupted horizontal fold in front of parietal plate; palatal folds *six*, four inner united by a vertical ridge, seven denticles posteriorly .... *austeni.*
B. Transverse parietal plate giving off anteriorly *above* a *short* horizontal fold, with a denticle below plate. Palatal folds *six*; shell 10–11 mm. .... *munipurensis.*
C. Transverse parietal plate giving off anteriorly *below* a *long* horizontal fold.
  a. With a median horizontal fold *continuous* to the peristome; shell 20 mm. .... *brachydiscus.*
  b. With a median horizontal fold *interrupted*; shell 16 mm. .... *dextrorsa.*

2. *Sinistral.*

A. Parietal plate simple.
  a. Horizontal fold below transverse parietal plate, *short*.
    α. No median fold.......................... *muspratti.*
    β. A long median fold present.
      * A third short horizontal fold between upper and lower parietal folds.
        † Palatal folds all horizontal; shell 10 mm... *perarcta.*
        †† Four palatal folds horizontal, two oblique; shell 12 mm........................ *kengtungensis.*

††† Palatal folds, one vertical, rest horizontal; shell 7·5 mm. . . . . *shiroiensis.*
** No third fold present . . . . *nagaensis.*
b. Horizontal fold below transverse parietal plate long, joined to apertural ridge. . . . . *perrieræ.*
c. Three short horizontal folds in front of transverse parietal plate, none below it . . . . *refuga.*
B. Transverse parietal plate giving off anteriorly below a short horizontal fold; a long median and a long lower fold present, joined to apertural ridge.
a. Palatal folds: all horizontal . . . . *shanensis.*
b. Palatal folds: one oblique, rest horizontal . . . . . *leiophis.*
C. Transverse parietal plate giving off anteriorly below a short horizontal fold, two short free horizontal folds above the latter, and a long one below joining the apertural ridge . . . . *brahma.*

III. Section Endoplon, *Gude.*

Dextral. Palatal folds horizontal, oblique, or almost vertical.

Type, *P. brachyplecta.*

Range. Burma, Tonkin.

Shell flattened.
a. Two vertical parietal plates . . . . *brachyplecta.*
b. One vertical parietal plate with two denticles in front . . . . *smithiana.*

IV. Section Plectopylis, s. s. *Gude.*
(Typical Section of Benson.)

Sinistral. Shell flattened. Palatal armature: one vertical lamina with three horizontal folds above, one below.

Type, *P. bensoni.*

Range. Burma.

A. Two transverse parietal plates.
a. Parietal plates parallel; upper horizontal palatal fold bisected. Shell less than 20 mm.
α. Median parietal fold truncate, not joined to apertural ridge . . . . *ponsonbyi.*
β. Median parietal fold not truncate, joined to apertural ridge . . . . *lissochlamys.*
b. Parietal plates divergent; upper horizontal palatal fold not bisected. Shell more than 20 mm. . . . . *magna.*
c. Anterior parietal plate giving off a long horizontal fold above, and
α. A short one below, half the length of upper; palatal folds in two series. . . . . *woodthorpei.*
β. Lower fold one-quarter of the length of upper; palatal folds in one series. . . . . *leucochila.*
. Three transverse parietal plates . . . . *feddeni.*

C. Parietal plate ramified.
- *a.* Shell acutely keeled. Parietal fold trifurcate; a short horizontal fold near aperture .... *cyclaspis.*
- *b.* Shell not keeled. Parietal fold trifurcate.
  - *α.* No horizontal fold below parietal plate, a free interrupted horizontal fold in front .... *cairnsi.*
  - *β.* Parietal fold giving off anteriorly an interrupted horizontal fold; a short horizontal fold below plate .... *linteræ.*
  - *γ.* Parietal fold giving off anteriorly a continuous fold.
    - * Shell thin .... *karenorum.*
    - ** Shell thick.
      - † Upper arm of parietal fold longest, lower horizontal fold united to apertural ridge . *repercussa.*
      - †† Lower arm longest, lower horizontal fold not united to apertural ridge.
        - § Whorls much flattened, umbilicus very shallow .... *anguina.*
        - §§ Whorls less flattened, umbilicus deeper . *bensoni.*

I. Section Endothyra, *Gude.*

Endothyra, Gude, Science Gossip, N. S. vi, 1899, p. 148.

Sinistral. Umbilicus moderate. Palatal folds horizontal or oblique.

Type, *Helix (Plectopylis) plectostoma*, Benson.

Range. Sikkim, Assam, Burma.

77. Plectopylis minor, *Godwin-Austen.*

Helix (Plectopylis) minor, Godwin-Austen, A. M. N. H. ser. 5, iv, 1879, p. 164; ibid., J. A. S. B. lxiv, 1895, pl. 7, fig. 3 (shell and animal).
? *Helix (Plectopylis) macromphalus*, var. *minor*, Blanford, J. A. S. B. xxxix, 1870, p. 18.
Plectopylis minor, Gude, Science Gossip, N. S. iv, 1897, p. 11, fig. 47 (shell and armature).
Plectopylis (Endothyra) minor, Gude, op. cit. vi, 1899, p. 148.

Original description :—" Shell sinistral, openly umbilicated, discoidal, hirsute. Sculpture coarse, with irregular transverse ribbing; colour pale umber, with regularly disposed broadish transverse bars of sienna brown; spire flat, only the first three whorls slightly rising above the others; suture shallow. Whorls 5, subangular on the periphery of the last, which has four distinct rows of short hairs, entire at the point. Aperture oblique, slightly descending: peristome lunate, slightly flattened on the upper outer margin, but very little reflected, the inner margins connected with a distinct ridge on the parietal side.

"The parietal vertical lamina is simple, with no distinct horizontal plica below it, as in *macromphalus*; the palatal plicæ are six in front, four behind, the basal one in front thin and longer than the others." (*Godwin-Austen.*)

Diam. maj. 5, minor 4 millim; alt. 2·5 millim.

Hab. Sikkim: Darjeeling (*Nevill, Stoliczka, Hungerford*); Rungun Valley (*Blanford*); India: Naga Hills (*Beddome*); Laisen Peak, Munipur (*Godwin-Austen*).

Lt.-Col. Godwin-Austen, in describing the present species, expresses the opinion that it is doubtless the form *minor* of *P. macromphalus* alluded to by Blanford in J. A. S. B. 1870, p. 18.

The parietal armature consists of a strong vertical plate, a little deflexed below anteriorly, having posteriorly two minute denticles,

Fig. 27.—*Plectopylis minor.*

one above and one below. A very thin, free horizontal fold occurs below the vertical plate, revolving as far as the parietal ridge at the aperture, where it becomes much attenuated (see fig. 27 *f*); this fold appears to be somewhat variable, for in a specimen in Mr. Ponsonby's collection, shown in fig. 27 *l*, it is very short, and scarcely extends beyond the vertical plate; while in another specimen, also in Mr. Ponsonby's collection, shown in fig 27 *d*, it is absent altogether. Lt.-Col. Godwin-Austen, in his description of the species, states: "Parietal vertical lamina simple, with no distinct horizontal plica below it."

The palatal armature is in two series; the anterior series consists of four thin horizontal folds, and the posterior series of six horizontal folds, the first of which is very minute, the next four a little broader and shorter than those of the anterior series, the fourth or fifth a little deflexed posteriorly, and the sixth very small and thin (see fig. 27 *g*). The specimen shown in figs. 27 *a–e* is in Mr. Ponsonby's collection, the one depicted in figs. 27 *f* and *g* is in my own collection, while that delineated in figs. 27 *h–l* also belongs to Mr. Ponsonby, who informs me that it was obtained from Mr. Hungerford, labelled *P. plectostoma* from Sikkim. An immature specimen in my collection, with four whorls completed, has the armature near the end of the fourth whorl and, except being smaller, identical with that of a mature shell. A specimen in the late Col. Beddome's collection, from the Naga Hills, labelled with the MS. name *P. minuta*, Bedd., I also refer to the present species; it is, however, a little smaller, measuring only 4 millim. in diameter; it is also a little more raised in the spire, and is more shining and darker.

78. **Plectopylis hanleyi**, *Godwin-Austen.*

Helix (*Plectopylis*) *hanleyi*, Godwin-Austen, A. M. N. H. ser. 5, iv, 1879, p. 164.
Plectopylis hanleyi, Gude, Science Gossip, N. S. v, 1899, p. 240.
Plectopylis (*Endothyra*) *hanleyi*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell sinistral, depressedly conoid, openly umbilicated, probably hirsute when young. Sculpture coarse, irregular, transverse ridges. Colour uniform ochraceous. Spire conoidal; apex blunt, smooth. Suture well marked. Whorls six, close-wound, convex; aperture semicircular, diagonal; peristome somewhat thickened, white, with a thin callus on the parietal margin [wall(?)] not to the extent of a ridge.

"Major diameter, 5·5; minor diameter, 5; altitude, 3 millim.

"Parietal vertical lamina simple; palatal plicæ in two rows, four long in front, four short behind, and one basal long.

"This shell is very distinct; it has somewhat the form of *P. plectostoma*, but is not so angular on the periphery, while the internal plication is quite different, besides being so much smaller in size." (*Godwin-Austen.*)

Hab. Sikkim?

No figure of this shell has been published, and the only specimen known was in the collection of the late Sylvanus Hanley. My endeavours to trace its whereabouts have proved unsuccessful.

79. **Plectopylis blanda**, *Gude.*

Plectopylis blanda, Gude, Science Gossip, N. S. iv, 1898, p. 264, fig. 70; ibid. Journ. Malac. vii, 1899, p. 34, fig. 11.

Plectopylis (*Endothyra*) *blanda*, Gude, Science Gossip, N. S. vi, 1899, p. 148.

Original description:—"Shell sinistral, depressed conical, widely and deeply umbilicated, whitish-corneous, finely and regularly ribbed. Spire conical, apex prominent, suture distinctly impressed. Whorls 6, tumid above, rounded below, increasing very slowly and regularly, the last not descending in front, angulated above the periphery and around the wide perspective umbilicus. The cuticle is produced into deciduous hairs on the ribs, forming spiral rows. Aperture oblique, lunate, a little flattened on the upper, outer margin. Peristome white, a little thickened and reflexed, the margins united by a slight, flexuous ridge on the parietal callus. Parietal wall with a strong, vertical plate, slightly deflected anteriorly and having two minute denticles posteriorly, the upper elongated vertically, the lower horizontally. A very thin horizontal fold occurs below the vertical plate and a very

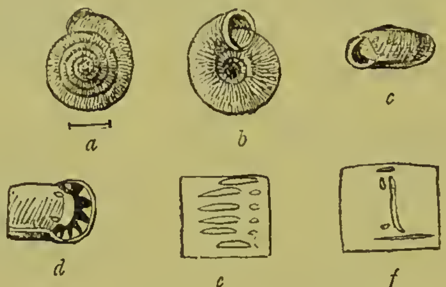


Fig. 28.—*Plectopylis blanda.*

short fold above it. Palatal folds in two series; the anterior consisting of six thin horizontal folds, the first and sixth a little shorter and placed a little further back than the other four; the posterior series consists of four very short folds or denticles.

"Major diam. 6, minor 5 millim.; alt. 3 millim." (*Gude.*)

Hab. Assam: Naga Hills.

Differs from *P. minor* in being larger and more elevated, and in having a wider and deeper umbilicus. The parietal armature differs in having an additional fold above the vertical plate, and the anterior denticles are almost united to this fold. The palatal armature differs in the posterior folds being very short and almost reduced to denticles. Fig. 28 *d* gives the posterior view of the two armatures, *e* shows the inside of the outer wall with the folds and denticles, and *f* a portion of the parietal wall with the plates, folds, and denticles *in situ*. All the figures are enlarged.

80. **Plectopylis macromphalus**, *Blanford.*

Helix (Plectopylis) macromphalus, Blanford, J. A. S. B. xxxix, 1870, p. 17, pl. 3, fig. 14; Godwin-Austen, P. Z. S. 1874, pl. 73, fig. 1 (armature).
Helix macromphalus, Hanley & Theobald, Conch. Ind. 1874, pl. 83, figs. 8–10; Nevill, Hand List, i, 1878, p. 71; Tryon, Man. Conch. ser. 2, iii, 1887, p. 160, pl. 34, figs. 65–68.
Plectopylis macromphalus, Pilsbry, ibid. ix, 1894, p. 146; Gude, Science Gossip, N. S. iv, 1897, p. 10, fig. 46 (armature).
Plectopylis (Endothyra) macromphalus, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Testa sinistrorsa, late umbilicata, depressa, discoidea, tenuiuscula, pallido-cornea, superne plicis arcuatis obliquis incrementi et liris spiralibus decussata, ad peripheriam et subtus fere lævis, striatula; striis nonnullis spiralibus circa umbilicum aliquando distinguendis; spira plana; apice vix emergente; sutura leviter impressa. Anfr. $4\frac{1}{2}$–$5\frac{1}{2}$ planulati, arcte voluti; ultimus vix latior, supra peripheriam sub-angulatus, ad latus atque subtus convexus, antice leviter descendens. Apertura irregulariter lunaris, superne compressa, diagonalis; peristoma albido-labiatum, parum incrassatum, reflexiusculum, marginibus convergentibus,

Fig. 29.—*Plectopylis macromphalus.*

callo tenui junctis, externo supra peripheriam arcuato. Plicatio interna persimilis ei *Helicis pinacis* et *H. plectostomatis*; e lamina unica parietali, verticali et plica tenui longuiscula basali, atque plicis 5 palatalibus: basali tenui simplici, ceteris duplicibus, constans.

"Diam. maj. $6\frac{1}{2}$, min. $5\frac{1}{2}$, alt. $2\frac{3}{4}$ mm." (*Blanford.*)

Hab. Assam: Mairung, Khasi Hills (*Godwin-Austen*); Dafla Hills (*Godwin-Austen*); Naga Hills (*Chennell*).

The parietal armature (see fig. 29 *a*) consists of a strong vertical plate, which has a minute, slightly elongated, horizontal denticle posteriorly to its lower extremity. The palatal armature is in two series (see fig. 29 *b*, which shows the inside of the outer wall). The anterior series is composed of four short, broad, flattened, straight horizontal folds. The posterior series consists of six narrow horizontal folds, which are shorter than those of the anterior series; the fourth and fifth are a little obliquely depressed posteriorly. The specimen is in Mr. Ponsonby's collection, and measures 6 millimetres in diameter. Two specimens in my collection also measure 6 millimetres in diameter.

81. **Plectopylis sowerbyi**, *Gude.*

Plectopylis sowerbyi, Gude, Science Gossip, N. S. v, 1899, p. 239, fig. 93 (shell and armature).
Plectopylis (*Endothyra*) *sowerbyi*, Gude, op. cit. vi, 1899, p. 148.

Original description :—" Shell sinistral, widely umbilicated, discoid, dark corneous, regularly ribbed and radiately distantly plaited, strongly decussated above by spiral ribs, less distinctly so below. Whorls six, narrow, increasing slowly and regularly, somewhat flattened above and rounded below, the last not descending in front. Six or seven spiral ridges, probably, when fresh, bearing rows of hairs, pass round the whole of the body-whorl, the first just above the slightly angular periphery, the others below it. Aperture ear-shaped; peristome slightly tinted with rosy-pink, scarcely thickened, and a little reflexed; the upper outer margin a little depressed; parietal callus slight,

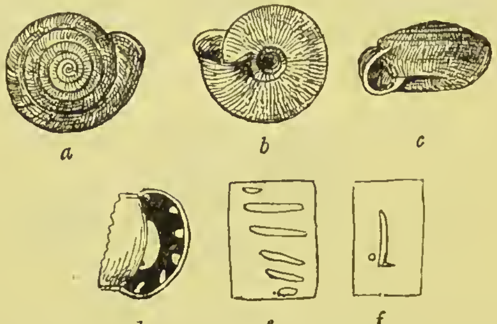


Fig. 30.—*Plectopylis sowerbyi.*

without raised ridge at the aperture. Umbilicus deep and wide. The parietal armature consists of a strong vertical plate, provided at its lower extremity with a short support anteriorly, and a small denticle posteriorly. The palatal armature is composed of six more or less horizontal folds, the first very slight and short, near the suture, the four next longer and more elevated, a little deflexed posteriorly, the sixth slight and very short." (*Gude.*)

Major diam. 7–9, minor 6·25–7·5 mill.; alt. 3·75–4·75 mill.

Hab. Assam: Khasi Hills.

P. sowerbyi is closely allied to *P. plectostoma*, from which it can at once be distinguished by the following characters: it is flatter, being less raised in the spire; the umbilicus is more open; there are only six whorls, the last not descending in front; the peristome is scarcely thickened and not much reflexed, and there is no raised ridge on the parietal callus. In the armature there are also important differences: the vertical parietal plate in *P. plectostoma* gives off from its upper extremity anteriorly a horizontal

fold, which is absent in *P. sowerbyi*, where the plate in question is only provided with a support anteriorly and a denticle posteriorly below, and there is no horizontal fold below it; so that in this respect the present species differs from both its allies (see fig. 30 *f*, which shows part of the parietal wall with its armature). The palatal armature is in one series, and consists of six horizontal folds. The first fold is very short and slight; the second longest; the third, fourth, and fifth each a little shorter than its predecessor; the sixth slight and very short (see fig. 30 *e*, which shows the inside of the outer wall with its folds). All the figures are enlarged.

82. **Plectopylis plectostoma**, *Benson.*

Helix plectostoma, Benson, J. A. S. B. v, 1836, p. 351; Reeve, Conch. Icon. vii, 1852, pl. 129, fig. 782; Pfeiffer, Conch.-Cab., Heliceen, i, 1846, p. 367, pl. 64, figs. 19–21; Nevill, Hand List, 1878, i, p. 71; Hanley & Theobald, Conch. Ind. 1870, pl. 13, fig. 2.
Helix (*Plectopylis*) *plectostoma*, Benson, A. M. N. H. ser. 3, v, 1860, p. 247; Blanford, J. A. S. B. xxxiv, 1865, p. 194; Godwin-Austen, P. Z. S. 1874, p. 612, pl. 73, fig. 2 (armature).
Helix (*Atopa* (*Plectopylis*)) *plectostoma*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 160, pl. 34, figs. 69, 70.
Plectopylis plectostoma, Gude, Science Gossip, N. S. iii, 1897, p. 274, fig. 39.
Plectopylis (*Endothyra*) *plectostoma*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"T. reversa, depresso-conoidea, subtus tumida; spira exsertiuscula; anfr. 5 supra planati, radiatim plicati, rugis transversis decussati, ultimus angulatus: angulo subtus marginato; apertura lunata, plica (ut in *H. personata*) interdum inconspicua, ultimo anfractui adhærente; umbilicus profundus, anfractus plerosque exhibens." (*Benson.*)

Diam. maj. 9, min. 8; alt. 4·5 mm.

Hab. India: Naga Hills (*Chennell*); Dafla Hills, Khasi Hills (*Godwin-Austen*). Burma: Arakan Hills (*Kurz*); Tongoop (*Ingram*); Bassein, Pegu (*Blanford*); Sylhet (*Nevill*). Sikkim: Darjeeling (*Blanford*, *Stoliczka*, *Mainwaring*).

A careful scrutiny of a number of shells in various collections revealed the fact that two different forms, one with and one without a horizontal fold given off from the parietal vertical plate, have been included under *P. plectostoma*, and it became therefore necessary to decide which of the two conformed to Benson's type in the Museum of Zoology at Cambridge. In 1897, through the kindness of Dr. S. F. Harmer, then in charge of the Museum, I was able to examine the type specimens, one of which I figured in 'Science Gossip,' and which is now reproduced. Although Benson's reference to the armature in his amended description (1860), "lamina 1 parietali verticali, simplici, lamellis nullis munita," inclined me to conjecture that the form without the

horizontal fold was the true *P. plectostoma*, the examination of the types did not bear out this view. All the shells of the Benson collection labelled Darjeeling, which are without doubt the types of the species, belong to the form with the horizontal fold, and this form must, therefore, be taken as the true *P. plectostoma*. The inspection of a large series of the two forms enabled me to obtain a fairly accurate idea as to the constancy of both forms and to draw up an amended description, which is now reproduced.

Shell sinistral, disk-shaped, more or less dark corneous brown, opaque, with a conical spire, deeply but somewhat narrowly umbilicated; it is composed of seven narrow, closely and regularly coiled whorls, which increase slowly and are a little rounded above and below; the last whorl scarcely widens near the aperture and shortly descends in front. The shell is radiately plicate and granulated by coarse spiral sculpture above, and decussated below, while the cuticle is thick and distinctly raised into distant transverse plaits. Five lines of scattered hairs, placed on raised ridges, pass round the whole length of the body-whorl, the first on the periphery, the second a little below it, the third, fourth, and fifth wider apart, the last being close to the umbilical angulation.

a b c

Fig. 31.—*Plectopylis plectostoma*.

The aperture is broadly ear-shaped; the peristome is whitish or rufous, thickened and reflexed, the upper margin widely arcuate; the raised ridge of the parietal callus is scarcely curved, and not perceptibly separated from the margins of the peristome. The parietal armature consists of a strong vertical plate which gives off anteriorly a strong, obliquely ascending support below and a horizontal fold above, slightly notched at the junction: on the posterior side of the plate are found two minute denticles, one near the upper and one near the lower extremity. A single, very short, free horizontal fold is found below the plate. The palatal armature consists of: first, a thin, short, horizontal fold close to the suture; secondly, a thin but longer and broader fold opposite the upper extremity of the vertical parietal plate, slightly indented in the middle, with the posterior extremity shortly reflected at an angle of 100°; thirdly, a similar shortly reflected horizontal fold, notched in the middle, and then suddenly deflected vertically; fourthly, a short, thin, broad fold, which has posteriorly to it an almost vertically deflected short broad fold; fifthly, a similar short horizontal fold, which has also posteriorly a short, broad,

descending fold, a little more oblique than the previous one; and sixthly, a very short and narrow horizontal fold near the lower suture, situate below the space between the two preceding series. Fig. 31 *a* is from one of the type specimens; it measures, major diameter, 9 millimetres; minor diameter, 8 millimetres; axis, 5 millimetres. Two other of these specimens measure 8·5 millimetres, and one 8 millimetres in diameter. Fig. 31 *b*, showing the parietal wall with its armature by itself, and fig. 31 *c*, showing the inside of the outer wall with its palatal folds, are from a specimen in my collection, from the Khasi Hills; it measures—major diameter, 8·5; minor diameter, 7·25; axis, 4·5 millim. The specimens of this form range from 8 to 9 millimetres in diameter.

Var. **tricarinata**, *Gude*.

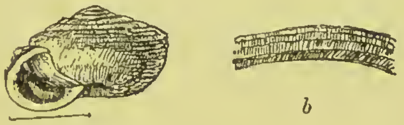
Plectopylis plectostoma, var. *tricarinata*, Gude, Science Gossip, N. S. iii, 1897, p. 275; ibid., Journ. Malac. vi, 1897, p. 45, fig. 2.

Differs from the type in being larger and more conical, in having the periphery acutely keeled, and in having three raised ridges between the periphery and the suture, revolving as far as the fourth whorl.

Diam. major 10, minor 9 mm.; axis 6 mm.

Hab. Bengal (*Benson*); Khasi Hills (*H. F. Blanford*).

This variety is based on two specimens from the Benson collection, labelled Bengal. The shell is shown enlarged in



a b

Fig. 32.—*Plectopylis plectostoma*, var. *tricarinata*.

fig. 32 *a*, while a portion of the last whorl, more enlarged, is depicted in fig. 32 *b*. The Blanford collection—now in the British Museum—also contains a specimen collected in the Khasi Hills by the late H. F. Blanford.

Var. **exserta**, *Gude*.

Plectopylis plectostoma, var. *exserta*, Gude, Journ. Malac. viii, 1901, p. 49, fig. 5.

Differs from the type in the peripheral keel being exserted. The shell is also larger and more solid. More than thirty specimens were received from a native collector.

Diam. major 10·5, minor 9·75 mm. : alt. 7 mm.
Hab. Assam : Khasi Hills.
Fig. 33 *d* shows the outline of the spire enlarged.

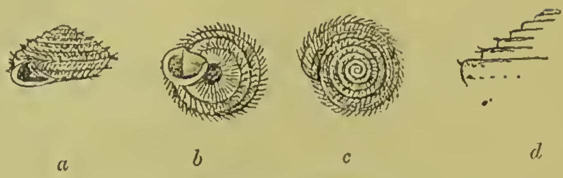


Fig. 33.—*Plectopylis plectostoma*, var. *exserta*.

83. **Plectopylis affinis**, *Gude*.

Plectopylis affinis, Gude, Science Gossip, N. S. iii, 1897, p. 276, fig. 41 (shell and armature).
Plectopylis (*Endothyra*) *affinis*, Gude, op. cit. vi, 1899, p. 148.

Original description :—" Shell sinistral, somewhat widely umbilicated, disk-shaped, pale yellowish corneous, translucent, radiately plicate, decussated by spiral lines above, smoother and shining below. Whorls 7, narrow, increasing slowly, the last widening towards the aperture, and descending a little in front, rounded above, flattened below ; four lines of soft pilose hairs pass round the whole length of the body-whorl, the first on the angulated periphery, the second a little below it, the third midway between the second and fourth, which is near the umbilicus. Aperture ear-shaped, elongated vertically ; peristome white, thickened and reflexed, upper margin a little depressed ; the raised flexuous ridge on the parietal callus is separated from the margins by a slight notch. Umbilicus deep and moderately wide. The parietal armature consists of a vertical plate with two short supports anteriorly, one above and one below, and two elongated denticles posteriorly, one above and one below ; two free, short, horizontal folds in a line occur below the vertical plate. The palatal armature is composed of six folds, the first and sixth short, thin and horizontal, the others longer and broader ; the second a little indented in the middle, with the posterior termination raised obliquely ; the third is notched in the middle, and deflects obliquely posteriorly ; the fourth and fifth are in two series separated by a short space, the anterior portion straight and horizontal, the posterior portion crescent-shaped and obliquely descending." (*Gude.*)

Diam. major 10, min. 9 mm. ; alt. 5·5 mm.

Hab. Assam : Khasi Hills.

Plectopylis affinis had previously been confused with *P. plectostoma*. It differs in being larger and much paler in colour, in having four instead of five rows of hairs, which are not placed on raised ridges as in that species ; the cuticle is much thinner and not plaited, while the spiral sculpture is less coarse above and scarcely

perceptible below, where the shell is also more shining than in *P. plectostoma.* It is translucent and the armature is distinctly visible through its wall, while the aperture is more narrowed laterally and the upper margin of the peristome is less arcuate, being a little inflected. The umbilicus is also wider and scarcely angulated, while the base is much more flattened. The ridge of the parietal callus is more raised and more curved. The parietal armature consists of a vertical plate with a very short support anteriorly at the upper and lower extremities, but without the horizontal fold above as in *P. plectostoma.* The two denticles

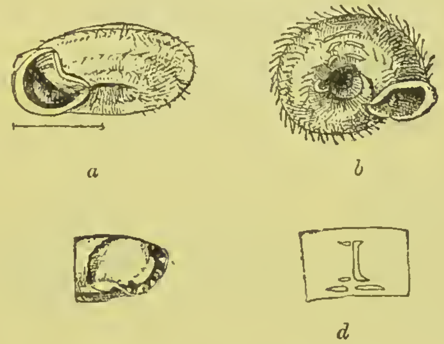


Fig. 34.—*Plectopylis affinis.*

on the posterior side are larger and more elongated, and below the vertical plate are two short, thin, horizontal folds in a line with each other (see fig. 34 *d*, which shows the parietal wall by itself; and fig. 34 *c*, which shows both armatures from the posterior side). The palatal armature is similar to that of *P. plectostoma*, but the posterior portions of the third, fourth, and fifth folds, instead of being straight and almost vertical, are crescent-shaped and oblique (see fig. 34 *b*, which shows the palatal folds as they appear through the shell-wall); an additional semi-circular fold, posterior to, but a little above, the fifth fold, occurs in this shell; this, however, I have not observed in any of the other specimens. Fig. 34 *a* shows the entire shell enlarged. My specimens were obtained from Mr. Fulton some years ago; the twenty-five further specimens from the same locality, sent to me for inspection by him, range from 9 to 11 millimetres in diameter. Two immature specimens in my collection are composed of five and a half whorls; one of these has the immature barriers complete, but the palatal folds are very short and the posterior oblique portions of the fourth and fifth folds are almost straight instead of crescent-shaped; externally a slight trace of previous folds can be discerned; in the other specimen the last immature folds are similar to those of the first specimen, but the remains of a previous set are in a less advanced stage of disintegration.

84. **Plectopylis pinacis**, *Benson.*

Helix pinacis, Benson, A. M. N. H. ser. 3, iii, 1859, p. 268; Hanley & Theobald, Conch. Ind. 1870, pl. 13, fig. 5; 1874, pl. 84, figs. 1, 4.
Helix (*Plectopylis*) *pinacis*, Benson, A. M. N. H. ser. 3, v, 1860, p. 247; Godwin-Austen, P. Z. S. 1874, pl. 74, fig. 1 (armature); Nevill, Hand List, i, 1878, p. 71; Godwin-Austen, J. A. S. B. xliv, 1875, pl. 7, fig. 2 (shell and animal).
Helix (*Atopa* (*Plectopylis*)) *pinacis*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 159, pl. 34, figs. 53–55.
Plectopylis pinacis, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146; Gude, Science Gossip, N. S. iii, 1897, p. 206, fig. 32 (shell and armature); Godwin-Austen, Moll. India, ii, 1907, p. 203, pl. 114, fig. 2 (anatomy).
Plectopylis (*Endothyra*) *pinacis*, Gude, Science Gossip, N. S. vi, 1899, p. 148.
Helix (*Corilla*) *pettos*, Martens, Malak. Blätt. xv, 1868, p. 158.
Helix pettos, Pfeiffer, Novit. Conch. ser. 1, iii, 1869, p. 462, pl. 101, figs. 7–9.

Original description:—"Testa sinistrorsa, late umbilicata, orbiculato-depressa, superne oblique scabre plicato-striata, liris confertis spiralibus, subtus striis obliquis flexuosis striisque spiralibus decussata, cornea, epidermide fusca, scabra (junioris ad carinam præsertim hispida) induta; spira planata, vix elevatiuscula, apice planato, sutura leviter impressa; anfractibus 7½ planulatis, lente et arcte accrescentibus, ultimo antice breviter descendente, superne subcarinato, subtus valde convexo, circa umbilicum profundum, perspectivum, conicum, compressiusculo; apertura valde obliqua, lunari, peristomate expansiusculo, reflexo, albido, marginibus callo brevi, laminari, elevatiusculo, sinuato junctis.

"Diam. maj. 14, min. 12½, axis 4½ mill." (*Benson.*)

Hab. Sikkim: Darjeeling (*Blanford*, *Stoliczka*, *Mainwaring*); Rungun, Pankabari (*Blanford*); Rungmaval (*Blanford*); Damsang (*Godwin-Austen*).

Nevill was the first to suspect that *Helix* (*Corilla*) *pettos* was identical with *Plectopylis pinacis*. The type of the former, which is in the "Königliche Museum für Naturkunde," Berlin, was forwarded to me for inspection in 1897 by the late Dr. von Martens, with permission to open the shell for the purpose of examining its armature, which enabled me to satisfy myself that the two species were in fact identical, both as regards armature and shell characters.

The parietal armature (fig. 35 *c*) consists of a single strong vertical plate, which is strongly abruptly deflected anteriorly at the lower extremity, and gives off posteriorly a club-shaped support; the upper extremity gives off two slight supports, one on either side, the posterior one horizontal, and the anterior one a little lower, oblique, and very short; a little below the posterior support occurs a small denticle; a free, thin horizontal fold is found below the vertical plate; see also fig. 35 *a*, which

shows the shell with a portion of the outer wall removed, exposing the parietal and palatal armatures from the anterior side, and fig. 35 *b*, which shows the folds from the posterior side. The palatal armature consists of: first, a thin horizontal fold near the suture; secondly, a stronger horizontal fold, deflected in the middle; thirdly and fourthly, two shorter, but stronger, equal and parallel folds descending obliquely; fifthly a crescent-shaped fold placed obliquely with the concave side facing the aperture (the lower surfaces of these folds are seen in fig. 35 *a*, their upper

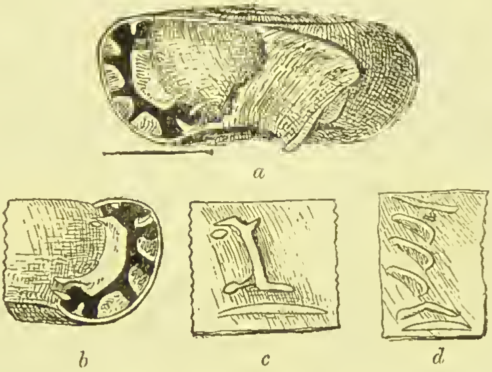


Fig. 35.—*Plectopylis pinacis.*

surfaces in fig. 35 *b*); sixthly, a smaller horizontal fold, which becomes attenuated posteriorly (see fig. 35 *d*); two minute, elongated denticles, one below the other, and placed at right angles to each other, occur between the first and second folds, near their posterior terminations. The specimen figured is from Darjeeling, and is in Mr. Ponsonby's collection; it measures 15 millimetres in diameter. A specimen in my collection, also from Darjeeling, measures 14 millimetres. Lt.-Col. Godwin-Austen's figure, quoted *supra*, shows a short free horizontal fold above the vertical parietal plate; no trace of this fold can be seen in either of the two specimens examined, neither does it occur in the specimen in the Berlin Museum.

85. **Plectopylis fultoni**, *Godwin-Austen.*

Helix (*Plectopylis*) *fultoni*, Godwin-Austen, A. M. N. H. ser. 6, x, 1892, p. 300.
Plectopylis fulloni, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146, pl. 40, figs. 13–15 (shell); Gude, Science Gossip, N. S. iii, 1896, p. 178, fig. 23 (shell and armature).
Plectopylis (*Endothyra*) *fultoni*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell sinistral, keeled, widely umbilicated, subglobosely discoidal; colour pale ochraceous; sculpture a

fine close flaxy epidermal striation, with four lines of long hairs arranged upon the periphery of the body-whorl—two closely adjacent and running with the keel above, one around the umbilical depression, and one intermediate. Spire depressedly convex, suture well marked, apex rounded. Whorls seven, closely wound, side of the last very oblique below and flattened, becoming rounder near the aperture, where it descends very slightly. Aperture wide, semi-ovate, very oblique, and slightly reflected on the margin. Peristome not thickened, continuous over the parietal side. The internal barriers are not visible on looking into the aperture. The parietal vertical lamina is simple, with only a slight horizontal support above on the posterior side; a very short double-knobbed horizontal parietal lamella is situated immediately below it. Palatal plicæ double, in two rows, the two apical or highest in position being united together by a low ridge; the posterior row are somewhat obliquely arranged." (*Godwin-Austen.*)

Major diam. 20, min. 17·3 millim.; alt. axis 8·5 millim.

Hab. Assam: Khasi Hills.

Plectopylis fultoni is allied on the one hand to *P. andersoni*, the parietal armature being almost identical, while the arrangement and structure of the palatal folds connect it on the other hand with *P. plectostoma.* The parietal armature consists of a single strong vertical plate (see fig. 36 *a*). Lt.-Col. Godwin-Austen, in describing the armature, states that the parietal plate has only a slight horizontal support above on the posterior side; in specimens in my possession, however, this plate has a similar support below; these supports consist of a tooth united to the vertical

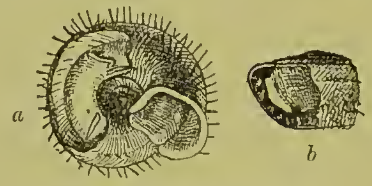


Fig. 36.—*Plectopylis fultoni.*

plate by a slight callosity. Below this is a short thin horizontal plate, a little indented in the middle. The palatal armature (see fig. 36 *b*) consists of: first, a short horizontal fold, close to and parallel with the suture; secondly, a longer and stouter horizontal flexuous fold; thirdly, another horizontal fold, slightly indented in the middle and deflected posteriorly at an obtuse angle; fourthly and fifthly, two series each of two short horizontal folds, the anterior ones slightly oblique, with their lower ends towards the aperture, and the posterior ones deflected at an obtuse angle posteriorly; and sixthly, near the base, a short slightly bent fold, with the convex side turned towards the lower suture. The specimen figured, which is not quite mature, bears a second

vertical plate on the parietal wall (see fig. 36 *a*), which appears to be the remnant of the immature barriers formed before the completion of the shell. A young specimen in my collection, composed of five whorls, possesses the armature a little beyond the place where four and a half whorls have been completed; the barriers are almost identical with the mature ones, except that the folds are smaller and the second and third palatal folds are deeply bilobed. A still younger specimen of only four whorls has the armature near the place when three and a half whorls have been completed.

II. Section Chersæcia, *Gude.*

Chersaecia, Gude, Science Gossip, n. s. vi, 1899, p. 148.

Sinistral or dextral. Umbilicus wide. Palatal folds horizontal or oblique. Sometimes with one oblique or vertical plate.

Type, *Helix leiophis*, Benson.

Range. Assam, through Upper Burma and Laos to Tenasserim.

86. **Plectopylis muspratti**, *Gude.*

Plectopylis muspratti, Gude, Science Gossip, n. s. iv, 1897, p. 10, fig. 45 (shell and armature); ibid., Journ. Malac. vii, 1898, p. 7, fig. 5.

Plectopylis (Chersaecia) muspratti, Gude, Science Gossip, n. s. vi, 1899, p. 148.

Original description:—"Shell sinistral, discoid, widely and deeply umbilicated, pale corneous, streaked transversely with dull

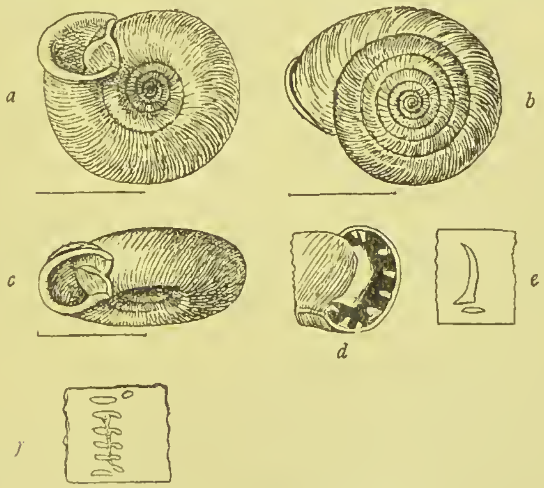


Fig. 37.—*Plectopylis muspratti.*

brown; finely striated and decussated with spiral lines which are very distinct on the upper surface, but less so below. Suture

impressed, spire a little conical. Whorls six and a half, scarcely convex, slowly increasing, the last widening towards the aperture, slightly angular above, descending suddenly in front, and a little constricted behind the peristome. Aperture roundly lunate; peristome white, thickened and reflexed, margins converging. Parietal callus with a strongly raised flexuous ridge, which is separated from both margins by a little notch. Umbilicus wide and deep. Parietal wall with a short entering flexuous fold united to the ridge at the aperture, becoming attenuated inwardly, and at one-third of the circumference from the aperture, with a strong, crescent-shaped vertical plate, which is suddenly deflected posteriorly at the lower extremity; below this, on the anterior side, occurs a very short, horizontal fold. Palatal folds six, horizontal, short; the first free, with a small denticle posteriorly; the second, third, fourth, and fifth connected with each other by a vertical ridge, which deflects below the fifth fold posteriorly and terminates in a small, oblique denticle; the sixth again free.

"Major diam. 13 mm., min. 11 mm., alt. 6 mm." (*Gude*

Hab. Assam: Naga Hills.

P. muspratti somewhat resembles *P. nagaensis*, but the armature is quite different. Fig. 37 *d* gives the posterior view of the parietal and palatal armatures, while fig. 37 *e* exhibits the inner wall with the parietal folds, and fig. 37 *f* the inside of the outer wall with the palatal armature.

87. **Plectopylis austeni**, *Gude.*

Plectopylis austeni, Gude, Science Gossip, N. S. vi, 1899, p. 15, fig. 97.
Plectopylis (*Chersaecia*) *austeni*, Gude, tom. cit. p. 148.

Original description:—"Shell sinistral, discoid, widely umbilicated, ochreous corneous, covered with a deciduous velvety cuticle; finely and closely ribbed, decussated by raised spiral lines, rather distant on the upper side. One of these spiral lines forms a ridge or keel on the upper angle of the whorls above the periphery, revolving above the suture as far as the third whorl. Spire concave, apex a little raised, suture strongly impressed. Whorls $6\frac{1}{2}$, flattened above, rounded below, obsoletely angulated around the umbilicus; increasing slowly at first, the last widening rather suddenly, and descending half the width of the whorl in front; aperture oblique, cordate. Peristome white, strongly thickened and reflexed, the margins united by a strong raised flexuous concave ridge, slightly notched at the junctions above and below. Umbilicus wide and rather shallow.

"Parietal armature consisting of a short median horizontal fold close to the apertural ridge, and a second, longer and farther back, rather elevated posteriorly, gradually descending on the shell-wall anteriorly; below its posterior extremity occurs a small denticle; still farther back is found a strong vertical crescent-shaped plate, the upper and lower extremities of which are deflected posteriorly.

"Palatal armature composed of six short horizontal folds, the first longest, near the suture, provided at its posterior extremity with an elongated denticle; the second, third, fourth, and fifth a little obliquely depressed posteriorly where they are united by a slight vertical ridge, which is continued above the second and below the fifth folds; on the posterior side occur five elongated denticles, the four lower of which correspond to the four folds,

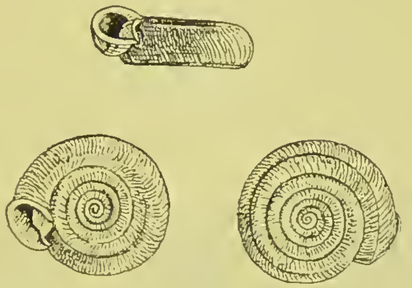


Fig. 38.—*Plectopylis austeni.*

while the fifth is situate near the upper extremity of the vertical ridge; the sixth fold is near the lower suture, and has also an elongated denticle posteriorly." (*Gude.*)

Major diam. 17·5–19, minor 14·75–16·5 mm.; alt. 5–6 mm.

Hab. Assam: Diyung Valley, Singpho (*Ogle*).

The present species is allied to *P. oglei*, but can readily be distinguished by its concave spire, being besides much smaller and much more flattened. In its parietal armature it differs in having a short and a long median horizontal fold and a denticle in front of the vertical plate, all of which structures are absent in *P. oglei*. A comparison of the figures will also reveal differences in the palatal armatures of these two species.

Plectopylis austeni has further, as regards palatal armature, some affinity with *P. muspratti*, but the latter is dextral and the parietal armature is quite different, as is also the general shape of the shell.

An immature specimen, which accompanied the three adult ones from which the description was drawn up, has only $5\frac{1}{2}$ whorls completed, and is interesting from the fact that it possesses two sets of armature, a quarter of a whorl distant from each other; these differ considerably from the mature barriers, the parietal armature consisting of only the vertical plate and a very short, slight, horizontal fold in front of it, while the palatal armature is similar to that of mature shells, except that the folds, ridge, and denticles are very small and slight.

88. **Plectopylis oglei**, *Godwin-Austen.*

Helix (*Plectopylis*) *oglei*, Godwin-Austen, J. A. S. B. xlviii, 1879, p. 3, pl. 1, fig. 2 (shell and parietal armature).
Helix (*Atopa* (*Plectopylis*)) *oglei*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 159, pl. 36, figs. 29–31.
Plectopylis oglei, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146; Gude, Science Gossip, N. S. iv, 1898, p. 263, fig. 68 (shell and armature).
Plectopylis (*Chersaccia*) *oglei*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell dextral, widely umbilicated, subdiscoid, dull pale brown with close-set sienna markings crossing the whorls. Epidermis thick and nacreous, and somewhat rough. Apex flat but slightly concave, the whorls rising regularly. Whorls 8, the last descends slightly near the aperture, which is very oblique and ovate. Peristome slightly reflected, white, continuous on the body-whorl, but not strongly developed. Palatal

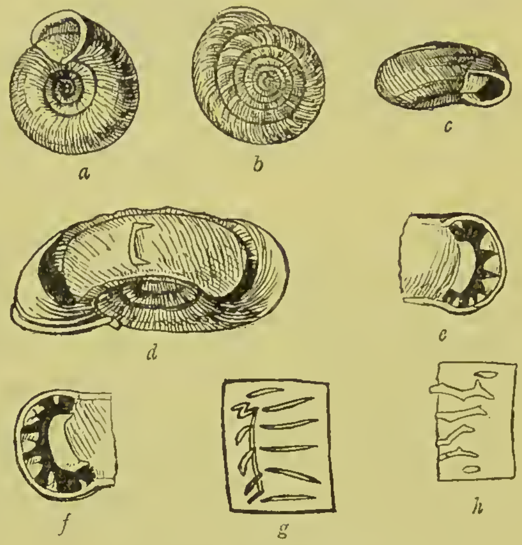


Fig. 39.—*Plectopylis oglei.*

teeth 6, 3rd, 4th, and 5th equal, 6th longer, double. On the parietal side is one single vertical lamina with buttress-like supports on posterior side above and below." (*Godwin-Austen*).

Major diam. 27, minor 25 mm.; alt. 8 mm.

Hab. Assam: Sadiya (*Ogle*).

The parietal armature consists of a single strong vertical plate, which gives off posteriorly two short ridges, one at the upper and one at the lower extremity (see fig. 39 *d*, which gives an enlarged view of a specimen with the outer wall removed). The palatal armature consists of six horizontal folds: the first, near the suture, very short and thin; the second, third, fourth, fifth, and

sixth bilobed or bisected about the middle, where a slight vertical ridge connects their posterior portions; the posterior portion of the second fold is sinuous, somewhat S-shaped; the third, fourth, and fifth are slightly deflected posteriorly; the sixth is very unequally bisected, the posterior portion being less than a third the length of the anterior portion, which is raised at first and then suddenly deflected (see fig. 39 *g*, which shows the inside of the outer wall of the shell enlarged). The illustrations were made from the type specimens in the collection of Lt.-Col. Godwin-Austen, who kindly lent them for examination. Figs. 39 *e*–*g* (enlarged), are taken from a specimen not quite full-grown; *e* shows the parietal and palatal armatures from the anterior side; *f* their posterior aspect, and *g* the inside of the outer wall with its folds. This specimen exhibits the remains of a previous parietal plate, one quarter of a whorl behind the permanent one. Fig. 39 *h* shows the inside of the outer shell-wall of the specimen depicted in fig. 39 *d*, the armature of which is incomplete, a portion having been broken away. Two immature specimens in different stages of growth exhibit armatures identical in all respects with those illustrated, except that the palatal folds are less bilobed.

The species under consideration is allied to *P. serica*, but it is larger, and presents considerable differences in the palatal armature.

89. **Plectopylis serica**, *Godwin-Austen.*

Helix (*Plectopylis*) *serica*, Godwin-Austen, P. Z. S. 1874, p. 608, pl. 73, fig. 5 (shell and armature).
Helix sericata, Hanley & Theobald, Conch. Ind. 1875, pl. 132, figs. 8, 9.
Helix (*Atopa* (*Plectopylis*)) *serica*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 159, pl. 34, figs. 49–52.
Plectopylis serica, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146; Gude, Science Gossip, N. S. iii, 1897, p. 205, fig. 31 (shell and armature).
Plectopylis (*Chersaecia*) *serica*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell dextral, very openly umbilicated, discoid, pale horny brown, very flat above, with regular narrow oblique bands of brown crossing the whorls. Epidermis thin. The apex very slightly higher than the adjacent and outer whorls. Whorls 7, narrow and closely wound, flat above, the last descending near the aperture, which is diagonal; outer margin circular; peristome white, reflected, continuous on the body-whorl or parietal margin. The palatal teeth, six in number, are situated rather more than one-third the circumference from the aperture; and, counting from above downwards, the first is very minute, the 4th, 5th, and 6th largest. On the parietal side of the whorl there is one single vertical lamina with short bifurcations or supports above and below." (*Godwin-Austen.*)

Major diam. 12·5, minor 11 mm.; alt. 4 mm.

Hab. India: Hengdan and Kopamedza Ridge, 5,000 ft, Burrail

Range, Naga Hills (*Godwin-Austen*); North Cachar (*H. F. Blanford*).

Lt.-Col. Godwin-Austen records the fact that one of the several specimens he opened, for the purpose of examining the internal barriers, contained two vertical parietal lamellæ, a reduplication of structure to which he thinks is clearly due the more compound forms of the plicæ and lamellæ in the Burmese species. I am inclined to think, however, that the second lamella to which he refers must be the remains of an earlier set of barriers as I have so frequently observed in other species, these earlier sets being gradually absorbed after the completion of the later sets. He states that it is essentially a forest species, found among dead leaves and moss.

The parietal armature consists of a single vertical plate, which descends a little obliquely towards the aperture; the upper extremity gives off on both sides a very short support, and at the

a b c

Fig. 40.—*Plectopylis serica.*

lower extremity, also on both sides, a stronger support, the anterior one being a little lower than the posterior one (see fig. 40 *a*). The palatal armature consists of five more or less oblique horizontal folds; the first is longest, flexuous, and descends a little posteriorly, the second is horizontal, and bifurcates posteriorly, the upper arm straight, the lower descending obliquely; the third, shorter, at first proceeding horizontally, about the middle deflecting obliquely at an angle of about 100 degrees; the fourth is a little longer, ascends a little at first and then deflects posteriorly at an angle of 90 degrees; the fifth is shortest, horizontal, near the lower suture and parallel to it (see fig. 40 *b*, which shows the armatures, parietal and palatal, from the posterior side, and fig. 40 *c*, which shows the inside of the outer wall, with its palatal folds; all the figures are enlarged). Lt.-Col. Godwin-Austen (*op. cit.* p. 608) mentions six palatal folds, and his figure shows a small one near the upper suture, of which, however, no trace is found in the specimen now figured, which is from Shiroifurar, and is in Mr. Ponsonby's collection; it measures 11 millimetres in diameter.

90. **Plectopylis munipurensis**, *Godwin-Austen.*

Helix (Plectopylis) munipurensis, Godwin-Austen, P. Z. S. 1874, p. 610, pl. 73, fig. 6 (shell and armature).
Helix (Atopa (Plectopylis)) munipurensis, Tryon, Man. Conch. ser. 2, iii, 1887, p. 160, pl. 34, figs. 56–58.

Plectopylis munipurensis, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146; Gude, Science Gossip, N. S. iv, 1898, p. 263, fig. 69 (shell and armature).

Plectopylis (*Chersaecia*) *munipurensis*, Gude, op. cit. vi, 1899, p. 148.

Original description.—"Shell dextral, openly umbilicated, tumidly discoid, thick, pale ochry-brown, with distant spots of colour on the upper surface. Umbilicus open and deep. Spire very depressedly conoid, suture shallow. Whorls 7, flat, the last narrowly constricted just behind the aperture and descending very slightly. At the upper and outer margin of the aperture is a slight compression giving a waved outline to the lip. Aperture very oblique, semicircular; peristome slightly reflected, white, a low narrow, curvilinear ridge joining the margins. The parietal vertical lamina is situated one-third of the circumference from the mouth, having an attached anterior short horizontal process equal to its length; short supports on the posterior

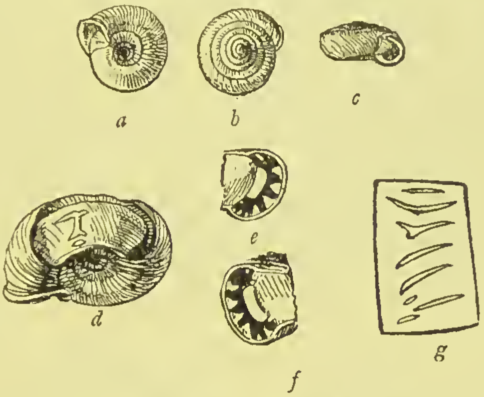


Fig. 41.—*Plectopylis munipurensis.*

extremity and curving slightly forwards on the lower. Palatal teeth 7, the first and upper minute, the second, third, fourth, and fifth horizontal, the second being the longest, sixth minute, seventh rather lengthened, horizontal, backed by a single isolated small tooth." (*Godwin-Austen.*)

Major diam. 10·5–11, minor 9–9·5 mm.; alt. 5 mm.

Hab. Burma: Ihang Valley, Munipur (*Godwin-Austen*).

The parietal armature consists of a single, strong, vertical plate, which is obliquely deflected towards the aperture; it has two slight supports posteriorly—the lower a little deflected, the upper obliquely raised—and gives off anteriorly, at the upper extremity, a long, slightly raised ridge; a minute denticle occurs just below the vertical plate (see fig. 41*d*, which gives an enlarged view of the shell with a portion of the outer wall removed). The palatal armature consists of six more or less horizontal folds: the first very minute near the suture; the second long and descending a little obliquely towards the middle, with the posterior end suddenly raised; the third and fourth also descending a little

obliquely, their posterior extremities dilated, almost bifurcated; the fifth also descending a little, its posterior termination suddenly deflected; the sixth, horizontal, with a minute denticle above, and an elongated one a little farther back, below the posterior termination of the fold (see fig. 41 *g*, which shows the inside of the outer wall of the shell). The figures are from the type specimens in the collection of Lt.-Col. Godwin-Austen, who obligingly lent them to me for this purpose.

Figs. 41 *a–c* are of natural size, while figs. 41 *d–g* are enlarged; *e* shows the armatures from the anterior and *f* from the posterior side, while *g* exhibits the inside of the outer shell-wall with the palatal barriers *in situ*.

91. Plectopylis nagaensis, *Godwin-Austen.*

Helix (Plectopylis) nagaensis, Godwin-Austen, P. Z. S. 1874, p. 609, pl. 73, fig. 4 (armature).
Helix (Atopa (Plectopylis)) nagaensis, Tryon, Man. Conch. ser. 2, iii, 1887, p. 161, pl. 35, figs. 78, 79.
Plectopylis nagaensis, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146: Gude, Science Gossip, N. S. iii, 1897, p. 206, fig. 33 (shell and armature).
Plcetopylis (Chersaecia) nagaensis, Gude, op. cit. vi, 1899, p. 148.

Original description.—" Shell sinistral, widely umbilicated, discoid, dull ochry-brown, epidermis thick and coarsely striate; above depressedly pyramidal. Whorls 7, flat, narrow, and those near apex closely wound, the last very descending near mouth. Aperture diagonal, broadly lunular, outer margin well rounded,

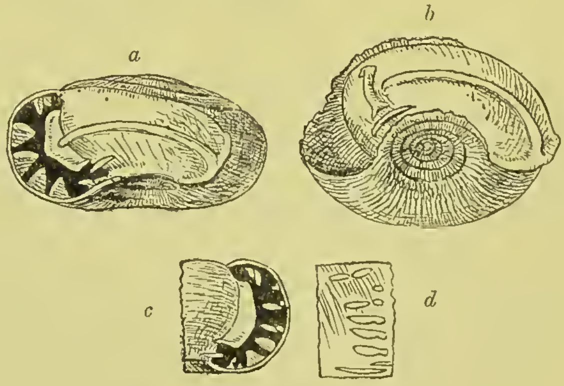


Fig. 42.—*Plectopylis nagaensis.*

peristome very thick, white, reflected. A thick ridge on the parietal side, separated by slight indentations, connects the inner margins; and from the middle of this runs back a long horizontal lamella, terminating close to, but not connected with, the single vertical lamina; this is thick and bifurcate below, tapering above and curving backwards; a short free lamella is

situated immediately under it. Palatal plicæ 6, horizontal, the first and upper small, the remainder about equal in size.

"Major diam. 12, minor 11 mm.; alt. 6 mm." (*Godwin-Austen.*)

Hab. India: Prowi, head of the Lauier River, Naga Hills, Assam.

A dwarfed variety is mentioned by Lt.-Col. Godwin-Austen, *l. c.* p. 610, from Sikhami, on the lowest part of the main watershed of the Burrail, measuring only: major diam. 8, minor 6·75 mm.; alt. 3 mm.

The parietal armature consists of a strong vertical plate, a little deflected posteriorly at the lower extremity, where it terminates in a short strong ridge; it also has a short support a little higher up on the anterior side, and another short ridge on the posterior side at the upper extremity. Below this plate is a free thin horizontal fold, and a little above the middle of the plate, a short distance from it, rises a strong horizontal plate, which runs parallel with the whorl, and descends a little at the aperture, where it is united with the raised ridge of the parietal callus (see fig. 42 *a* and *b*, which show the shell with part of the outer wall removed).

The palatal armature consists of: first, a thin bilobed horizontal fold near the upper suture; secondly, a stronger horizontal fold, with a small denticle at its posterior termination (between these two folds, in a line with their posterior terminations, occurs a minute denticle); thirdly, a horizontal fold, descending a little posteriorly, where it is slightly notched; fourthly, a similar horizontal fold deflected posteriorly at first, then slightly raised and notched; fifthly, a shorter but stronger horizontal fold with the posterior end more strongly deflected, and also slightly notched; sixthly, a thinner but longer horizontal fold near the lower suture, attenuated anteriorly (see fig. 42 *d*, which shows the inner side of the outer shell-wall with its palatal folds).

Between the posterior terminations of the fifth and sixth folds occurs a very slight thin fold extending much further posteriorly than the main folds; this may prove not to be constant; it is not mentioned by Lt.-Col. Godwin-Austen in his description. The specimen figured is in Mr. Ponsonby's collection, and, measures: major diam. 11·5, minor, 10 mm.; alt. 5·5 mm.

92. Plectopylis kengtungensis, *Gude.*

Plectopylis (*Chersæcia*) *kengtungensis,* Gude, Proc. Malac. Soc. London, xi, 1914, p. 54, with text-figure.

Original description:—"Shell sinistral, widely umbilicated, discoid, corneous. Whorls $6\frac{1}{4}$, narrow, increasing slowly and regularly, somewhat flattened above, rounded below, the last abruptly and shortly descending in front and slightly dilated at the mouth. Spire a little raised, suture impressed. Aperture obovate, peristome slightly thickened and reflected; upper margin nearly straight, outer rounded, columellar ascending; parietal

callus with a raised flexuous ridge slightly notched at the junctions above and below.

"Parietal armature (fig. 43 *b*) composed of a vertical plate, deflexed posteriorly above, with a short obliquely ascending ridge below, projecting on both sides; a long horizontal fold rises a short distance from the vertical plate, running parallel with the whorl and joining the raised ridge at the aperture; below this occurs a second, but very short fold, 2 mm. long, also rising close to the vertical plate and in a line with its lower extremity; below the vertical plate runs a third, but very thin and slight horizontal fold close to the lower suture and joining the ridge at the aperture. The palatal armature (fig. 43 *a*) consists of: first, a thin bilobed horizontal fold near the upper suture; next, two horizontal rather thin elevated folds, followed by two stouter and rather less elevated folds, obliquely ascending towards the mouth; and lastly, a thin horizontal fold near the lower suture,

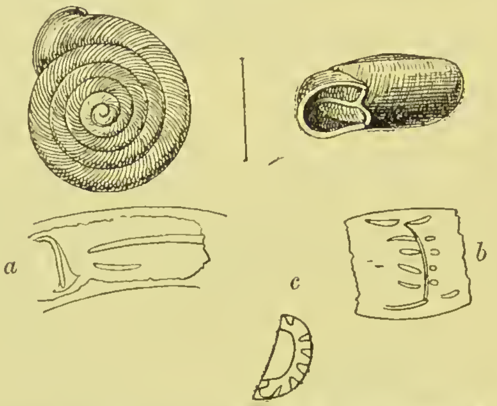


Fig. 43.—*Plectopylis kengtungensis.* (From Proc. Malac. Soc. London.)

longer than the others and gradually attenuated anteriorly; all, except the first fold, are provided posteriorly with a slight denticle, while a low transverse ridge unites their posterior terminations. Fig. 43 *c* gives the posterior view of the parietal and palatal barriers." (*Gude.*)

Major diam. 12, minor 10, alt. 4·75 mm.

Hab. E. Burma: Kengtung (*Woodthorpe*).

Three specimens in the Godwin-Austen collection, British Museum, were found upon examination to be closely allied to *P. nagaensis*, G.-A. The new species, however, is more depressed and lacks the spiral sculpture of its ally which also has the barriers placed nearer the aperture, and the third, fourth, and fifth palatal folds more oblique, while *kengtungensis* possesses a short horizontal median fold which is absent in *nagaensis*. It also resembles *P. muspratti*, Gude, in having the palatal folds united posteriorly by a low ridge and in having the barriers at the same distance from the aperture, but in the latter species the palatal folds are much shorter and stouter and it lacks the long horizontal parietal fold as well as the short median fold, being only provided with a short fold at the aperture.

93. Plectopylis leiophis, *Benson.*

Helix (Plectopylis) leiophis, Benson, A. M. N. H. ser. 3, v, 1860, p. 246; Blanford, J. A. S. B. xxxiv, 1865, p. 94; Godwin-Austen, P. Z. S. 1874, pl. 74, fig. 2 (shell and armature); Tryon, Struct. Conch. iii, 1884, p. 33, pl. 94, fig. 25.
Helix (Atopa (Plectopylis)) leiophis, Tryon, Man. Conch. ser. 2, iii, 1887, p. 163, pl. 35, figs. 88, 89.
Plectopylis leiophis, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 145; Gude, Science Gossip, N. S. v, 1898, p. 16, fig. 76 (shell and armature).
Plectopylis (Chersaecia) leiophis, Gude, op. cit. vi, 1899, p. 148.
Helix refuga, Pfeiffer in Philippi, Abb. Beschr. Conchyl. iii, 1847, *Helix*, p. 2, pl. 10, fig. 4; ibid., Conch.-Cab., Heliceen, i, 1848, p. 383, pl. 66, figs. 21–23; Reeve, Conch. Icon. vii, 1852, pl. 82, fig. 436; Theobald, J. A. S. B. xxvi, 1857, p. 249; Hanley & Theobald, Conch. Ind. 1870, pl. 13, fig. 8 (non Gould).
Helix (Plectopylis) pseudophis (Blanford), Godwin-Austen, P. Z. S. 1874, p. 610, pl. 74, fig. 3 (shell and armature).
Helix (Atopa (Plectopylis)) pseudophis, Tryon, Man. Conch. ser. 2, iii, 1887, p. 162, pl. 35, figs. 80, 81.
Plectopylis pseudophis, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146; Gude, Science-Gossip, N. S. iv, 1897, p. 170, fig. 62 (shell and armature); v, 1898, p. 17, fig. 77 (armature).
Plectopylis leiophis (=pseudophis), Gude, Proc. Malac. Soc. London, viii, 1908, p. 88.

Original description:—"Testa sinistrorsa, late et profunde umbilicata, subdiscoidea, superne planata, interdum omnino plana vix solidula, oblique et arcuatim rugoso-striata, lineis nonnullis spiralibus decussata, sub epidermide scabra, fusco-cornea, albida; spiræ apice vix elevatiusculo lævigato, sutura impressa; anfractibus 5½–6½ angustis, ultimo supra peripheriam angulato, antice valde deflexo, basi rotundata, apertura valde obliqua subhorizontali, lunari, peristomate reflexo albido, marginibus lamina sinuosa elevata, medio lamellam profunde intrantem, usque ad januam attingentem emittente junctis. Janua pliciformi fauciali prima remota; lamina 1 parietali verticali simplici forti lamellam aperturalem valde elongatam superne emittente, infra eam lamellis duabus brevibus (a lamina spatio brevi separatis) munita; plicis 6 palatalibus intrantibus, quinta robustiore obliqua.

"Diam. major 11–14, minor 8–11·5, alt. 3–6 mill." (*Benson.*)

Hab. Burma: Kwadouk, Thyet-Myo (*Benson*); Akoutoung (*Blanford*).

Lt.-Col. Godwin-Austen stated (P. Z. S. 1875, p. 44) that *P. leiophis* was identical with Gould's *Helix refuga*, basing this identification on the specimens in the British Museum, so labelled by Cuming. Upon comparing the latter with Benson's type specimens, obligingly lent to me in 1898 by Dr. S. F. Harmer, then in charge of the University Museum of Zoology, Cambridge, I found they were indeed identical, but the specimens in the British Museum had been wrongly identified by Cuming and Pfeiffer. They formed the subject of the illustrations purporting to represent *H. refuga* in Philippi's work, quoted above, in Reeve's Conch. Icon., and in Conch.-Cab. All these figures must, therefore, be referred to *P. leiophis.*

Lt.-Col. Godwin-Austen in 1874 described and figured *Plectopylis pseudophis* which he considered to be allied to *P. perarcta*, evidently overlooking its close relationship with *P. leiophis*, as pointed out by me in 1897 and 1898 when I investigated these forms. The principal points of difference alleged between the two supposed species appear to be the following: in *P. leiophis* the parietal vertical plate is rounded in outline, in *pseudophis* it is toothed; in the former the lower parietal horizontal fold is continuous, in the latter it is interrupted; *leiophis* has a very short horizontal fold between the long upper and the shorter lower parietal fold, a feature lacking in *pseudophis*; while, lastly, the latter was said to be more elevated in the spire. I was at first inclined to regard these differences as specifically valid, more especially as I had not been able to examine the barriers of *P. pseudophis* when dealing with that species in 1897, and had to rely upon Lt.-Col. Godwin-Austen's figure. In 1898 the Rev. Ashington Bullen, since deceased, favoured me with a specimen which accorded with *P. pseudophis* in every respect except that it had an additional short fold between the long upper and the shorter lower horizontal parietal fold, resembling *leiophis* in that feature, but, as I pointed out at the time, this character appeared to be inconstant in that species. In 1908, however, I received three specimens of *Plectopylis* from Mr. Robert Cairns, which at first I was inclined to regard as an undescribed form intermediate between the two species. This led me carefully to examine once more all the specimens of *leiophis* in my collection, which had considerably increased since first I studied these structures. This examination proved to me conclusively that the features differentiating the two alleged species are inconstant, for while some specimens have the elevated spire and the toothed outline of the vertical lamina of *P. pseudophis*, and possess the short fold between the two other horizontal folds, stated to characterize *P. leiophis*, others, again, have a depressed spire, although the vertical lamina is toothed in a varying degree, being entire in some. The palatal armature is identical in all the specimens examined. It appears, therefore, that no constant character differentiates *P. leiophis* and *P. pseudophis* and the two must consequently be united under one name. Fig. 46*a* represents a specimen, labelled *pseudophis*, in the British Museum, while figs. 46*b* and *c* are copied from Godwin-Austen's original figures. The shell drawn in fig. 44*a* is in Mr. Ponsonby's collection, showing the anterior view of the two armatures, *b* represents the posterior aspect of these, while *c* shows the parietal wall with its vertical lamina and horizontal folds. Finally figs. 45*a* and *b* exhibit the parietal and palatal armatures respectively of the shell I received from the late Rev. Ashington Bullen, which I had referred to *P. pseudophis*.

The armature of *P. leiophis* may now be described as follows:—

The parietal barriers comprise: a strong vertical lamina, toothed or entire, angular above, where it gives off posteriorly an abruptly

descending short ridge, while below it deflects obliquely and gives off on the anterior side a comparatively short horizontal fold; a long free horizontal fold rises close to the vertical plate, a little below its upper extremity, revolving parallel with the whorl as far as the aperture, when it unites with the ridge on the parietal callus; between these two folds sometimes occurs a very short, free, horizontal fold; (one immature specimen in my collection possesses in addition an elongated denticle between this short fold and the long upper fold). A very thin, free, horizontal fold

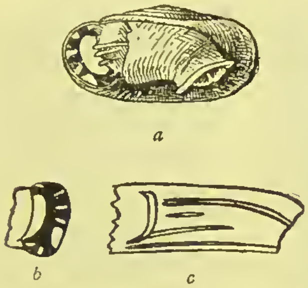


Fig. 44.—*Plectopylis leiophis.*

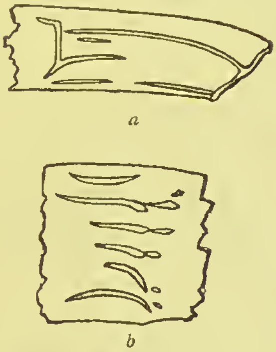


Fig. 45.—*Plectopylis leiophis.*

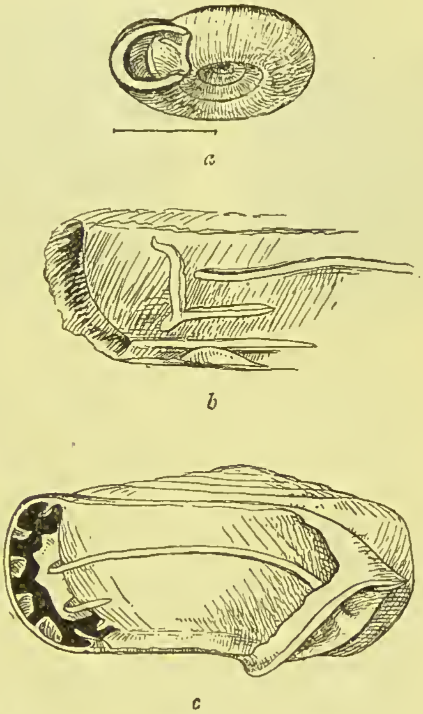


Fig. 46. — *Plectopylis pseudophis.* (*a*, original; *b* and *c*, after Godwin-Austen.)

rises below the vertical plate, running close to the lower suture and terminating near the apertural ridge.

The palatal armature consists of: first, a short thin horizontal fold near the suture; secondly, a longer horizontal fold, somewhat deflected posteriorly, with an additional short wedge-like fold attached to it, which has posteriorly, a little above it, a small denticle; thirdly, a shorter horizontal fold widened towards the posterior extremity, then suddenly attenuated and indented, and finally again widened a little; fourthly, a short, slightly curved horizontal fold, descending a little posteriorly, also slightly

attenuated and indented near the posterior extremity; fifthly, a crescent-shaped, sub-vertical fold (the concave side being towards the aperture and the lower suture), with a small denticle near its posterior extremity; and sixthly, a longer curved horizontal fold, having its upper edge reflected towards the fifth fold, and possessing a small denticle near its posterior extremity.

94. **Plectopylis refuga**, *Gould.*

Helix refuga, Gould, Proc. Boston Soc. Nat. Hist. ii, 1846, p. 99.
Helix (*Corilla*) *rufuga*, Gould, Otia Conch. 1862, p. 198.
Plectopylis refuga, Blanford, British Burma Gazetteer, i, 1879, p. 709; Gude, Science Gossip, N. S. v, 1898, p. 15, fig. 75 (shell and armature).
Plectopylis (*Chersaecia*) *refuga*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Testa sinistrorsa, discoidea, supra plana, infra concava, viridi-cornea: anfr. 6 arcte volutis, confertim striatis, ultimo prope aperturam deflexo; sutura impressa; apertura perobliqua, subcordiformi, peristomate albo, reflexo, callo sinuoso connexo; fauce lamella alba, flexuosa, ad anfractum penultimum volvente.

"Diam. $\frac{3}{5}$ [=15·25 mm.]; alt. $\frac{1}{5}$ poll. [=5 mm.]." (*Gould.*)

Hab. Burma: Tavoy (*Gould*); Tenasserim, Pegu (*Blanford*).

Plectopylis refuga has long been confused with *P. leiophis* and the two were by most authors regarded as identical. This confusion arose from the fact that the figures, purporting to represent the former, given by Philippi, Pfeiffer, and Reeve, were based on the specimens in the Cuming collection, now in the British Museum, and, as I have already stated when discussing *P. leiophis*, wrongly identified as *P. refuga* by Reeve and Pfeiffer, as careful comparison with Benson's types has proved to me. The short description given of the species by Gould might apply equally well to several distinct shells and is insufficient to enable us to determine which form he had before him.

The type specimens of this and two other species of *Plectopylis* described by Gould—*repercussa* and *anguina*—being in the possession of the New York State Museum, I requested the loan of them in 1898, but the Trustees decided not to let the specimens go out of the country. Dr. Merrill, the Director of the Museum, however, very obligingly had the shells photographed and their armature sketched for me, and these were reproduced in 'Science Gossip' at the time, the same figures doing service on the present occasion. Dr. Bagg, Dr. Merrill's assistant, kindly communicated the following notes concerning *P. refuga*:

"*Helix refuga*, Gould, catalogue number, 271; original number, A, 562. Two earliest volutions smooth, remainder of shell very finely striated and hairy. Outer volution on lower side angular. Greater diameter nearly $\frac{3}{4}$ inch [=19 mm.]; smaller diameter, $\frac{9}{16}$ inch [=14 mm.]; alt. $\frac{5}{32}$ inch [=4 mm.]; length of horizontal

fold at aperture, $\frac{3}{16}$ inch [=5 mm.]. Basal denticle [*i. e.* vertical parietal plate] cup-shaped."

A discrepancy occurs between the measurements originally given by Gould and those supplied by Dr. Bagg; as the diameter indicated by the former, however, agrees with that of the photographs, allowance being made for their enlargement, Gould's measurements must, I think, be accepted as correct.

From figs. 47 *d* and *e*, which have been copied from Dr. Bagg's sketches, it appears that the parietal armature consists of a strong vertical plate which is concave posteriorly; on the posterior

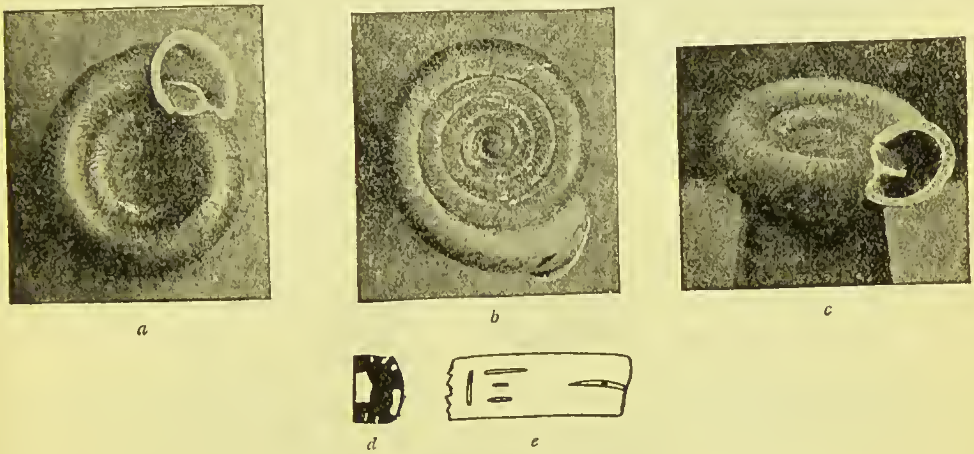


Fig. 47.—*Plectopylis refuga.*

side there are three short horizontal folds, the upper longest, the median shortest; a short horizontal fold at the aperture is united to the flexuous ridge (see fig. 47 *e*, which shows the parietal wall); while the palatal armature appears to consist of six folds: the first three short and horizontal; the fourth strong, vertical, slightly indented about the middle; the fifth and sixth horizontal and thin (see fig. 47 *d*, which gives the posterior aspect of both armatures). Figs. 47 *a–c* are reproduced from the photographs of the type specimens, enlarged two diameters.

95. Plectopylis perrieræ, *Gude.*

Plectopylis perrierae, Gude, Science Gossip, N. S. iv, 1898, p. 231, fig. 67 (shell and armature); ibid., Journ. Malac. vii, 1898, p. 14, fig. 10.

Plectopylis (*Chersaecia*) *perrierae*, Gude, Science Gossip, N. S. vi, 1899, p. 148.

Original description:—" Shell sinistral, discoid, widely and deeply umbilicated, pale corneous, very finely and regularly striated, and decussated by spiral lines. Suture slightly impressed, spire

flattened, apex a little raised. Whorls six to seven, increasing slowly and regularly, flattened above, rounded below, the last angulated above the periphery and round the umbilicus, and descending shortly and abruptly in front. Aperture heart-shaped; peristome white, scarcely thickened, a little reflected; the margins united by an elevated sinuous ridge on the parietal callus, notched at the lower junction. Umbilicus wide and deep. Parietal wall with a thin vertical plate, strongly deflected posteriorly below, and giving off a short horizontal ridge at the upper extremity on each side; a long horizontal flexuous fold rises close to the upper extremity of this plate on the anterior side, descending suddenly at first, then ascending gradually, and afterwards gradually descending, following the deflection of the last whorl, becoming united to the ridge at the aperture; a second, shorter, horizontal fold occurs below this one, rising close to the

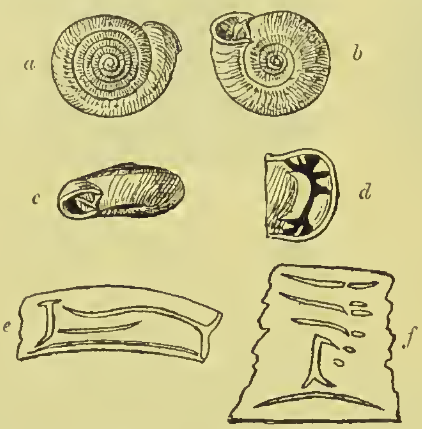


Fig. 48.—*Plectopylis perrieræ.*

lower extremity of the vertical plate, proceeding horizontally at first, and then ascending a little; another very thin fold rises below the vertical plate, running parallel to the lower suture as far as the aperture, where it unites with the ridge. Palatal folds, five; the first, rather long and thin, near to and parallel with the suture, with a deep indentation near the posterior extremity, dividing it into two unequal parts; the second, horizontal, a little deflected posteriorly, with an elongated denticle posteriorly, and a second, smaller, one above the first; the third fold much shorter, strongly curved downwards posteriorly, with a minute denticle posteriorly; the fourth fold vertical with an obliquely descending ridge posteriorly at the upper extremity, and bifurcated at the lower extremity, the anterior arm of the bifurcation the shorter; a minute denticle occurs near the ridge at the upper extremity and a second one near the middle, both on the posterior side; the fifth fold is thin, horizontal, and strongly deflected on both sides." (*Gude.*)

Major diam. 15, minor 12 mm.; alt. 5 mm.

Hab. Burma: Thyet-Myo, Pegu; Kyengdwen Valley, N.W. Burma (*Ogle*).

In contour this species resembles *Plectopylis perarcta*, but the shell is much larger. The parietal armature further connects it with the species just named, but the palatal armature is more like that of *P. leiophis*.

The specimen figured, and one in the late Miss Linter's collection, have the measurements given in the diagnosis, but my second specimen measures only 12·5 millimetres in diameter. Figs. 48 *a–c* show the shell in three different aspects, natural size; figs. 48 *d–f* are enlarged; *d* shows the parietal and palatal armatures from the posterior side; *f*, the inside of the outer wall with the palatal folds and denticles; and *e*, the parietal wall with its plate and folds.

Two specimens collected by Ogle, in the Godwin-Austen collection, now in the British Museum, I refer to this species.

96. **Plectopylis shiroiensis**, *Godwin-Austen.*

Helix (*Plectopylis*) *shiroiensis*, Godwin-Austen, P. Z. S. 1874, p. 609, pl. 73, fig. 3 (shell and armature).
Helix shiroiensis, Hanley & Theobald, Conch. Ind. 1875, pl. 159, fig. 7.
Helix (*Atopa* (*Plectopylis*)) *shiroiensis*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 163, pl. 35, fig. 90.
Plectopylis shiroiensis, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 145; Gude, Science Gossip, N. S. iii, 1896, p. 155, fig. 20 (shell and armature), tom. cit. p. 204.
Plectopylis (*Chersaecia*) *shiroiensis*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell sinistral, openly umbilicated, discoidal, thin, light brown, very finely striated. Apex flatly convex; suture slightly impressed; umbilicus open and deep. Whorls 6, the last rounded, sharply compressed on the lower part behind the aperture and descending to it. Aperture broadly lunate, very oblique; peristome white, continuous, reflected. From the centre of the parietal ridge completing the peristome a lamella runs up that side of the whorl for three-sevenths of the circumference towards the parietal plication, but does not join it; and here a short free horizontal lamella lies parallel to and below it. The parietal vertical lamina is simple, with one short support at the lower anterior end; and below this is another, free, narrow, horizontal lamella. Palatal teeth consist of 4, that are horizontal; the 4th is long, narrow, and curving inwards. Between the 3rd and 4th is a vertical double-notched tooth, evidently a compound and representative of two very oblique plicæ." (*Godwin-Austen.*)

Major diam. 8, minor 7 mm.; alt. 4 mm.

Hab. India: Shiroifurar, N.E. of Munipur.

P. shiroiensis is allied to *P. perarcta*, and is likewise sinistral but the shell is smaller, it is more raised in the spire and the last whorl is deflected in front. There are also differences in the armature:

of the parietal barriers the principal horizontal lamella is more flexuous, being somewhat raised towards the vertical plate as well as towards the aperture before its final deflection at its junction with the parietal callus; it is also much broader. The second horizontal plate is likewise broader and flexuous, while both are a little further distant from the vertical plate (see fig. 49 *a*). The vertical plate is smaller and is rounded at its upper extremity, while it is not deflected posteriorly below, as is the case in *perarcta*. There are, besides, two small very short ridges given off from the extremities of the vertical plate on its posterior side, and the third horizontal is a little longer, as well as more flexuous. The chief difference, however, is in the palatal barriers, as may be seen on reference to figs. 49 *b–d*. The first fold is horizontal, small, and bilobed, close to the suture; then come two horizontal folds,

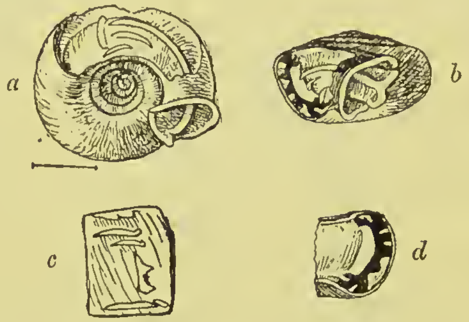


Fig. 49.—*Plectopylis shiroiensis.*

small but comparatively broad; next a broad and strong vertical bilobed lamella, giving off on the posterior side two short ridges from the base of the lobes, and finally below this a small but broad horizontal fold with a small denticle a little above and posterior to it. Fig. 49 *b* shows the barriers from the side of the aperture and fig. 49 *d* from behind. The specimen figured is in Mr. Ponsonby's collection.

97. **Plectopylis perarcta**, *Blanford.*

Helix (Plectopylis) perarcta, Blanford, J. A. S. B. xxxiv, 1865, p. 75; Godwin-Austen, P. Z. S. 1874, pl. 74, fig. 4 (shell and armature); ibid., op. cit. 1888, p. 243.
Helix perarcta, Pfeiffer, Novit. Conch. ser. 1, iii, 1869, p. 502, pl. 108, figs. 13–15; Hanley & Theobald, Conch. Ind. 1870, pl. 13, fig. 3.
Helix (Atopa (Plectopylis)) perarcta, Tryon, Man. Conch. ser. 2, iii, 1887, p. 162, pl. 35, figs. 91–95.
Plectopylis perarcta, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146; Gude, Science Gossip, N. S. iii, 1896, p. 155, fig. 19.
Plectopylis (Chersaecia) perarcta, Gude, op. cit. vi, 1899, p. 148.

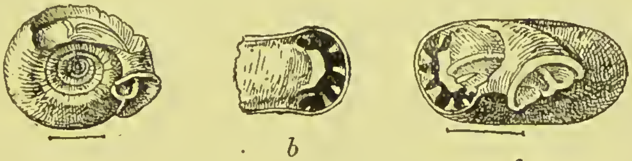
Original description.—"Shell sinistral, widely umbilicated, discoid, rather thin, white, transversely sinuously striated, with faintly

marked decussating spiral lines above and below. Apex minutely granulate, slightly raised above the flat spire, suture rather deeply impressed. Whorls 6, convex above and at the periphery, the last a little compressed behind the mouth, descending suddenly to the aperture, which is oblique and roundly lunate; peristome white, expanded all round; margins joined by a somewhat curved ridge, from the centre of which a lamella runs up the whorl towards the parietal plication, which, however, it does not join. The parietal vertical lamina is single, simple, rather short, slightly curved, with a rudimentary transverse plait at the top. Two free horizontal lamellæ occur beneath that running to the aperture, the lowest being the longest and thinnest, and running back beneath the base of the vertical lamina. Palatal teeth 6, all horizontal except the 4th and 5th, which are slightly oblique. Umbilicus open, deep, exposing all the whorls.

"Major diam. 11, minor 9 mm.; alt. 4 mm." (*Blanford.*)

Hab. Upper Burma: Mya Leit Doung, near Ava (*Blanford*); Hlindet (*Spratt*, Coll. *Ponsonby*).

The specimen here figured is in Mr. Ponsonby's collection and measures 10 millim. in diameter. The parietal armature is composed of a broad vertical plate, angulated above, but gradually decreasing towards the base, where it is also slightly deflected posteriorly. A horizontal lamella rises anteriorly about its middle, very close to it, yet distinctly separate (see fig. 50 *a*), proceeding parallel to the whorl, deflecting with it towards the aperture and joining the raised flexuous bilobed ridge of the parietal callus, which is separate from the peristome (see fig. 50 *c*). Another horizontal but very short lamella, below the principal one, also rises close to the vertical plate; a short free horizontal lamella is



a *b* *c*

Fig. 50.—*Plectopylis perarcta.*

seen below the vertical plate, but it does not pass beyond it posteriorly (see fig. 50 *a*; this third horizontal lamella is also shown sideways in figs. 50 *b* and *c*). Lt.-Col. Godwin-Austen, in comparing the present species with *Plectopylis pseudophis* [now shown to be synonymous with *P. leiophis*], states that the horizontal lamella is not continuous, and it is shown to be interrupted in his figure (Proc. Zool. Soc. 1874, p. 609, pl. 74, f. 4), and again, in describing *Plectopylis brachydiscus* (Journ. Asiat. Soc. Bengal, xlviii (1879), p. 2), he informs us that that species resembles *P. perarcta* in this respect. The specimen here figured, however, has the principal horizontal lamella continuous, a fact which induced me at first to doubt the specific identity of the shell

figured by me with *P. perarcta*, but as the second horizontal lamella is joined to the vertical plate in *P. pseudophis*, and in my specimen this lamella is quite free, as stated to be the case in *P. perarcta*, it is evident that my shell is not *P. pseudophis*; moreover, Mr. Blanford, in describing the shell, states that from the centre of the curved ridge at the aperture, "a lamella runs up the whorl towards the parietal plication." It may, therefore, safely be assumed that in the type specimen the horizontal lamella is not interrupted, and the question arises whether the shell figured by Lt.-Col. Godwin-Austen was perfect in having the horizontal plate interrupted in the manner described. The palatal armature is simple, and consists of four short, somewhat strong horizontal folds, equidistant and parallel, with a smaller one above, close to the suture, and two small ones in a line with each other below, also near the suture (see figs. 50 *b* and *c*, the former figure showing the posterior, and the latter the anterior ends of the folds; of the two bottom folds only one is visible in either figure).

98. **Plectopylis brachydiscus**, *Godwin-Austen.*

Helix (Plectopylis) brachydiscus, Godwin-Austen, J. A. S. B. xlviii, 1879, p. 2, pl. 1, fig. 1 (shell and parietal armature).
Helix (Atopa (Plectopylis)) brachydiscus, Tryon, Man. Conch. ser. 2, iii, 1887, p. 162, pl. 36, figs. 32–34.
Plectopylis brachydiscus, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146; Gude, Science Gossip, N. S. iii, 1896, p. 154, fig. 18 (shell and armature).
Plectopylis (Chersaecia) brachydiscus, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell dextral, umbilicus very open and shallow, very discoid, rather strong, dull umber-brown, epidermis thick with a cloth-like texture, finely and beautifully ribbed longitudinally; in young fresh shells the upper outer margin is closely set with a strong regular epidermal fringe about ·075 inches long. Spire quite flat, approaching the concave in some specimens, the apex itself having a subpapillate form. Whorls 7, the last rather flat on the side and angular above, descending at the aperture, which is very oblique and oblate. Peristome strongly reflected, thickened, white, the margins connected by a well raised ridge, notched above and below. A long horizontal lamella is given off from the upper middle portion of this towards the vertical parietal lamina, but only extends for 0·20 inches, then terminates, but at ·15 inches is again developed, becoming thicker and higher as it approaches the vertical lamina and ending just short of it, in this respect being similar to *P. perarcta*.

"The parietal vertical lamina is pointed above and gives off from the lower basal end a short lamella towards the aperture, and a very slight short thin, free lamina is to be seen just below the vertical barriers. Palatal teeth simple, six, the 2nd, 3rd, 4th, and 5th are the best developed, the 1st and last are small, 2nd the longest." (*Godwin-Austen.*)

Major diam. 21–24, minor 17–21·5 mm.; alt. 6–7 mm.

Hab. Lower Burma: Mulé-it range, east of Moulmain (*Limborg*).

The shell forming the subject of the present illustration is in Mr. Ponsonby's collection and, being old and weatherworn, does not possess the marginal fringe of hairs referred to and shown in Godwin-Austen's figure.

The parietal callus has a strong, raised, flexuous ridge, separated from the peristome by a notch above and below, and has, in addition, about the middle, a free lamella, 3 millim. long (see fig. 51 *a*). The parietal armature further consists of a broad, vertical plate, angulated above, and giving off at its lower end,

a *b.* *c*

Fig. 51.—*Plectopylis brachydiscus.*

towards the aperture, a horizontal plate, 4 millimetres long, which slopes abruptly towards the parietal wall and gradually loses itself, while on the posterior side there is a very short ridge abruptly sloping obliquely downwards (see figs. 51 *a* and *b*); about the middle of the vertical plate a free horizontal plate occurs, about 7 millimetres long, separated from the vertical plate by a distance of 1 millimetre, decreasing in height as it approaches the aperture, and then suddenly terminating (see fig. 51 *a*). The palatal armature is very curious (see fig. 51 *c*, which shows it *in situ*), and consists of six folds; the first straight and horizontal; the second also straight and horizontal, but with a small bifurcation at the posterior end; the third partly horizontal and deflecting posteriorly at an obtuse angle; the fourth very short horizontally, descending vertically for a short distance and then deflecting posteriorly; the fifth very short, flexuous, and nearly vertical; while, finally, the sixth is again almost horizontal. A little below, and to the left of the sixth fold is a small tooth, while above, posteriorly to the first fold, and almost in a line with the bifurcation of the second fold, are three minute teeth.

In looking through the British Museum collection I came across two immature specimens, which are of interest from the fact that the armature differs in some important particulars from the mature type. The parietal vertical plate in these specimens is sinuous in outline at the upper part, and at its lower extremity gives off anteriorly a horizontal fold 3 mm. long, which slopes abruptly and slightly ascends the parietal wall towards the upper suture; on the posterior side it is furnished with a short ridge; a very short horizontal fold occurs between this vertical plate and

the lower suture. The free horizontal plate has not yet been formed. About 3 mm. behind the vertical parietal plate is found the remnant of a previous barrier, almost absorbed. The palatal folds are similar to those of mature specimens, but the second is not bifurcate.

99. **Plectopylis dextrorsa**, *Benson.*

Helix (Plectopylis) refuga, var. *dextrorsa*, Benson, A. M. N. H. ser. 3, v, 1860, p. 4.
Helix refuga, var. *dextrorsa*, Hanley & Theobald, Conch. Ind. 1870, pl. 13, fig. 9.
Helix (Atopa (Plectopylis)) refuga, var. *dextrorsa*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 164, pl. 35, fig. 2.
Helix (Plectopylis) dextrorsa, Godwin-Austen, P. Z. S. 1875, p. 44.
Plectopylis dextrorsa, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 145; Gude, Science Gossip, N. S. iii, 1896, p. 156, fig. 21.
Plectopylis (Chersaecia) dextrorsa, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Janua pliciformi fauciali prima remota; lamina 1 parietali magna verticali simplice antice lamellam 1 inferiorem elongatiusculam emittente, lamella superiore valde elongata aperturæ laminam parietalem non omnino attingente, plica basali obsoleta; plicis palatalibus intrantibus 6, tribus superioribus et basali elongatis sinuosis, quarta et quinta brevibus, postice plicis obliquis distinctis munitis." (*Benson.*)

Major diam. 17, minor 14 mm.; alt. 5 mm.

Hab. Lower Burma: Phye-than, Tenasserim Valley (*Benson*).

Originally described by Benson as a variety of *P. refuga*, it was raised to specific rank by Lt.-Col. Godwin-Austen in 1875, who stated that it was very close to *P. pseudophis* [=*leiophis*], but his

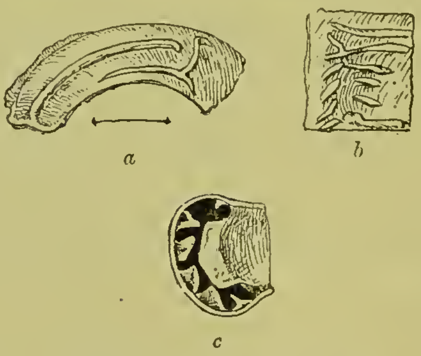


Fig. 52.—*Plectopylis dextrorsa.*

figure of that species—copied *ante* p. 101, fig. 46—does not bear out this view, and after careful comparison I came to consider its nearest ally to be *P. brachydiscus*. The shell, however, is smaller than in that species, measuring 16 millim. in diameter, and there

are important differences in the armature of the two. In the present species the parietal vertical plate is rounded at the top and forms a short ridge posteriorly, while another much smaller ridge is formed at the base, first proceeding a little horizoutally and then becoming deflected towards the lower suture (see fig. 52 *a*); the principal horizontal fold begins at a little distauce from the vertical plate as in *P. brachydiscus*, but it is placed above the middle and therefore nearer the upper suture thau iu that species, and instead of revolving parallel with the suture, it beuds npwards a little aud proceeds without interruption as far as its junction with the raised ridge of the parietal callus (see fig. 52 *a*) at the aperture, whereas in its ally this is interrupted. Differences in the palatal armatnre will be observed on refereuce to fig. 52 *b*, where the inner side of the shell-wall bearing the folds and denticles is showu. The first fold is long and horizontal; the second is also horizontal and bifurcates as in the other species; next come two series of three folds each, the anterior ones horizontal, the posterior ones smaller and descending obliquely; aud lastly we find a strong broad denticle parallel with and near to the lower suture, with a smaller one posteriorly in a line with it. Fig. 52 *c* shows the barriers—parietal and palatal—from the posterior side. All the figures are based on a specimen in Mr. Ponsonby's collection. The Bensou collection in the University Museum of Zoology, Cambridge, contains four specimens of *P. dextrorsa*; they measure 17 mm. in diameter.

100. **Plectopylis shanensis**, *Stoliczka.*

Plectopylis shanensis, Stoliczka, J. A. S. B. xlii, 1873, p. 170.
Helix (*Plectopylis*) *shanensis*, Hanley & Theobald, Conch. Ind. 1875, pl. 149, figs. 8, 9 (shell); Nevill, Hand List, i, 1878, p. 71 (*shawensis*).
Helix (*Atopa* (*Plectopylis*)) *shanensis*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 162, pl. 36, figs. 10, 11.
Helix (*Plectopylis*) *trilamellaris*, Godwin-Austen, P. Z. S. 1875, p. 43.
Plectopylis shanensis, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146; Gude, Science Gossip, N. S. iv, 1897, p. 36, fig. 48; vi, 1899, p. 77, fig. 105 (shell and armature).
Plectopylis (*Chersaecia*) *shanensis*, Gude, op. cit. vii, 1899, p. 148.

Original description:—"Pl. testa plauorbulari, pallide fusca, apice minutissime exserto, pallido; anfractibus 6½, angustis, sutura indistincte marginata junctis, primis 2½ ad tribus minute rugulosis, cæteris transversim oblique striatis atque concentrice obsolete striolatis, ultimo ad peripheriam subrotundato, infra paululum augustiore, ad aperturam modice deflexo; umbilico spatioso, anfractus omnes sutura distincte marginata separatos exhibente; apertura angulum circiter 55° attingentem cnm axi formante, peristomate undique expansiusculo atqne incrassato, margaritaceo lutescente, circumdata, ad utramque terminationem labii subangulati profuude incisa; labio plicis tribus distinctis instructo, plica

mediana crassissima, ea atque infera multo tenniore usque ad peristoma exteusis, tertia interposita a margine remote evanescente, sed usque ad laminam internam verticalem, circiter tertiam partem unius circuitus a margine apertnrali distantem extensa; ultimo anfractu intus supra laminam verticalem antice plicis sex crassiusculis, postice plicis decem brevioribus atque tenuioribus instructo.

"Diam. maj. 21·5, min. 17, et 6·5 diam. aut alt. aperturæ 7·5 mm.

"Diam. spec. secundi minoris suut: 18·5, 15, 5·8, 6·6 mm." (*Stoliczka.*)

Hab. Burma: Shan States (*Stoliczka*); Kuengan, Pegu (*Theobald*).

The two shells collected by Theobald, which were discovered by Godwin-Austen and Nevill in the Indian Museum, Calcutta, and described as a new species under the name of *trilamellaris* by Godwin-Austen, were subsequently found by him to be identical with Stoliczka's species (J. A. S. B. xlviii, 1879, p. 2).

The parietal armature consists of a strong horizontal mediau fold, revolving over nearly half of the outer whorl, and united to the ridge at the aperture, but it is free posteriorly. A short distance beyond it occurs a strong vertical lunate plate, which is deflected posteriorly below, where it gives off a short support; on the anterior side of this vertical plate, also below, a strong horizontal fold is given off, extending a little over half the length of

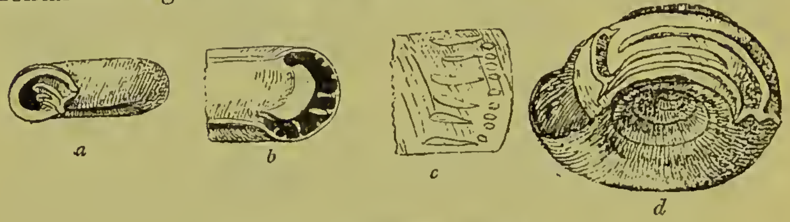


Fig. 53.—*Plectopylis shanensis.*

the median fold. A third horizontal thin fold, close to the lower suture, commences just below the vertical plate, and is united to the ridge at the aperture (see fig. 53 *d*, which shows the shell with the outer wall removed, and fig. 53 *b*, which gives the posterior view of the parietal aud palatal armature). All three horizontal folds are visible from the aperture as seen in fig. 53 *a*. The palatal armature is in two series: the anterior series consists of six thin horizontal subequal folds, while the posterior series is composed of nine short denticles arranged in a vertical row (see fig. 53 *c* which shows the inside of the outer wall). The specimen figured is in the British Museum, and measures—major diam. 19·5 mm.; minor diam. 15·5 mm.; alt. 6 mm.; it is from the Shan States. A specimen in the McAndrew collection in the University Museum of Zoology, Cambridge, labelled *Plectopylis repercussa*, proved on examination to pertain to the species now under consideration. It measures—major diam. 20 mm.; minor diam. 15 mm.; alt. 6 mm.

101. **Plectopylis brahma,** *Godwin-Austen.*

Helix (Plectopylis) brahma, Godwin-Austen, J. A. S. B. xlviii, 1879, p. 3, pl. 1, fig. 3 (shell and armature).
Helix (Atopa (Plectopylis)) brahma, Tryon, Man. Conch. ser. 2, iii, 1887, p. 164, pl. 36, figs. 35–37.
Plectopylis brahma, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 145; Gude, Science Gossip, N. S. iv, 1897, p. 170, fig. 63 (shell and armature).
Plectopylis (Chersaecia) brahma, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell sinistral, rather closely umbilicated, discoidal, pale ochry-brown, finely and regularly striate. Apex flat, yet slightly convex. Whorls 7, last angular above and rounded below, slightly compressed behind the aperture and hardly descending. Aperture lunate, oblique. Peristome slightly reflected and thickened, white, continued as a callus on the body-whorl.

"Internal structure complicated; the parietal vertical lamina is strong and gives off a short horizontal lamella at the lower end; above this are two other and parallel *free* lamellæ (in three cases out of twelve I examined, the upper *lamella* was united to the vertical barrier, but this does not affect the order of position and

a *b* *c*

Fig. 54.—*Plectopylis brahma.*

arrangement of all those processes in this species), both short, the lower being the best developed; the upper is occasionally united to the upper end of the vertical barrier. There is a very thin thread-like lower free lamella extending to the peristome and uniting with the parietal callus. The palatal *plicæ* are arranged in two rows, those of the anterior row are few and large, four in number, the two upper long, narrow, and adjacent, the 3rd is a flattened dome-like mass, the 4th is long and curving inwards. Behind this at a short distance is the second row, consisting of fourteen very minute, closely arranged, thin, longer or shorter tooth-like processes, those on the upper side being slightly the largest." (*Godwin-Austen.*)

Major diam. 9, minor 8·5 mm.; alt. 5 mm.

Hab. Assam: Brahmakhund (*Ogle*).

Lt.-Col. Godwin-Austen states that in external form the present species resembles *P. shiroiensis,* from which it may be distinguished by the coarser periostracum and more regular striation, while the last whorl is not constricted near the aperture. The parietal armature consists of a strong vertical plate having a short

support posteriorly above and below, and giving off anteriorly at the lower extremity a short horizontal fold; above this are two free longer horizontal folds, the upper one rising close to the vertical plate, the lower one longer and rising a little further from the vertical fold. A minute denticle occurs between the second and third horizontal folds, aud a horizontally elongated denticle above the upper extremity of the vertical fold; a very thin slight fold runs near to and parallel with the lower suture, uniting with the ridge at the aperture (see fig. 54 *c*, which shows the parietal wall with its folds). The palatal armature is in two series, the anterior one consisting of four elongated horizontal folds, the second and third being separated by a wider space than the others, while the posterior series is composed of thirteen or fourteen minute denticles arranged close together, some a little elongated. The shell figured is in the British Museum. It measures—major diam. 8, minor 6·5 mm.; alt. 4·5. mm.

102. **Plectopylis andersoni**, *Blanford.*

Helix (Plectopylis) andersoni, Blanford, P. Z. S. 1869, p. 448; Godwin-Austen, ibid. 1874, p. 612, pl. 74, fig. 9 (armature); Nevill in Anderson, Zool. Res. Two Exped. West. Yunnan, i. 1878, p. 876; Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 323.

Helix andersoni, Hanley & Theobald, Conch. Ind. 1875, pl. 112 figs. 8. 9.

Helix (Atopa (Plectopylis)) andersoni, Tryon, Man. Conch. ser. 2, iii, 1887, p. 161, pl. 34, fig. 71, pl. 35, figs. 74–75.

Plectopylis andersoni, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 146; Gude, Science Gossip, N. S. iii, 1896, p. 154, fig. 17.

Plectopylis (Chersaecia) andersoni, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Testa dextrorsa, latissime umbilicata, discoidea, solidula, albida, epidermide crassula fusca, interdum ad peripheriam laciniatim fimbriata, induta, sub epidermide decussato-striata, lineis spiralibus supra distinctis, infra subobsoletis. Spira plana, apice vix prominente, sutura subimpressa. Anfr. 7½–8, angusti, arcte convoluti, supra planulati, iufra in umbilico convexiusculi, ultimus superne ad peripheriam angulatus, subtus tumidus et circa umbilicum pervium, omnes anfractus monstrantem, obtuse compressus, pone aperturam leviter decendens, juxta peristoma constrictus. Apertura perobliqua, rotundato-lunaris; peristoma album, undique expansum, superne ad extremam peripheriam leviter angulatim porrectum, marginibus lamella curvata, ad ambas extremitates incisa junctis, lamina intranti uulla. Janua interna remota, ad ⅓ anfractuum ab apertura sita, e plica unica verticali parietali, 4 palatalibus horizontalibus, harum tribus inferioribus versus extremitates altioribus, medio humilibus, postice subbifidis, una basali etiam horizontali simplici constans.

"Diam. maj. 26, min. 23, alt. 8½ mill." (*Blanford.*)

Hab. Upper Burma: Bhamo, Ava (*Anderson, Fea*); Yunnan: Hoetone (*Anderson*).

The shell is solid, disc-shaped, measuring 24 to 26 millimetres in diameter, of a light brown colour, with alternating streaks of a lighter shade on the upper surface. It is composed of eight whorls, distinctly ribbed above and below, and very regularly decussated above by raised spiral lines reaching as far as the apex of the shell, the base is also spirally sculptured, but the sculpture is less distinct; the mouth of the shell is unarmed, but the parietal callus forms a raised curved ridge which is distinctly free at both ends from the peristome. The armature, which is comparatively simple, occurs a little beyond the middle of the last whorl, and consists of a simple strong vertical plate on the parietal wall (see fig. 55 *a*), giving off at its upper extremity a very small horizontal tooth on the posterior side and a short horizontal lamella, 1·5 millimetres long, on the anterior side, while at its lower extremity there is a slight callus on the posterior side. The vertical parietal plate is shown sideways in fig. 55 *b*, where also

a *b* *c*

Fig. 55.—*Plectopylis andersoni.*

the palatal teeth are seen as they appear from the posterior side. Fig. 55 *c* gives the inside view of the outer wall, exhibiting the palatal armature, which consists of four principal horizontal lamellæ terminating posteriorly in a triangular conical tooth; above these are: first a minute tooth, and secondly, higher up, a small fold near the suture, while at the base of the palatal wall are also: first a minute tooth, and secondly, nearer the suture, a small fold. The specimen figured is in Mr. Ponsonby's collection.

III. Section Endoplon, *Gude.*

Endoplon, Gude, Science Gossip, n. s. vi, 1899, p. 148.

Dextral. Palatal folds horizontal, oblique, or almost vertical.
Type, *Helix* (*Plectopylis*) *brachyplecta*, Benson.
Range. Burma, Tonkin.

103. Plectopylis smithiana, *Gude.*

Plectopylis smithiana, Gude, Science Gossip, n. s. iii, 1897, p. 274, fig. 38 (shell and armature).
Plectopylis (*Endoplon*) *smithiana,* Gude, op. cit. vi, 1899, p. 148.

Original description :—" Shell dextral, discoid, widely umbilicated, rufous brown, coarsely and regularly ribbed, with scarcely visible microscopic sculpture above, but strongly decussated with spiral lines below, suture impressed. Whorls 6, convex, slowly increasing, the last rapidly widening towards the aperture, not angulated above, shortly descending in front. Aperture subtriangular; peristome light brown, a little thickened and reflexed, the margins converging; parietal callus with a strongly raised flexuous ridge, separated from both margins of the peristome. Umbilicus very wide but shallow. Parietal wall, with an entering flexuous horizontal fold, united to the ridge at the aperture, and at one-third of the circumference from the aperture with one crescent-shaped vertical plate, which has two small denticles, one above and one below, on the anterior side. Palatal folds 6, the first and sixth thin and horizontal, the other four short, broad, and oblique." (*Gude.*)

Major diam. 27, minor 21 mm.; alt. 10 mm.

Hab. Burma: Attaram.

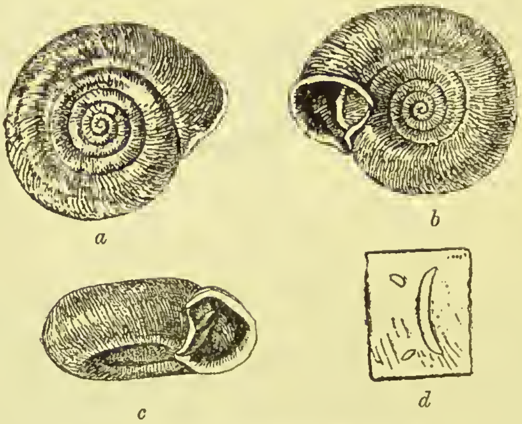


Fig. 56.—*Plectopylis smithiana.*

Two specimens in the Theobald collection in the British Museum, labelled *P. brachyplecta*, in spite of some external resemblance to that species, presented sufficient differences to induce me to suspect that they were quite distinct, and upon opening one of them the difference in the armature quite confirmed this suspicion.

P. smithiana differs from *P. brachyplecta* in being larger and darker in colour. The ribs are coarser and the whorls more convex; the last whorl is not angulated above, and it widens more towards the aperture. The peristome is less thickened and more reflected, and the ridge of the parietal callus less stout but more raised, while the umbilicus is wider and much more shallow. The horizontal parietal fold deflects more at the aperture, and there is only one vertical plate (see fig. 56 *d*), which is crescent-

shaped, with the convex side towards the aperture; on its anterior side, in place of a second vertical plate as in *P. brachyplecta*, are found two elongated, oblique, converging denticles, one above and one below. The palatal armature is similar to that of *P. brachyplecta*. Fig. 56 *d*, which shows the parietal wall, is from one of the specimens in the British Museum. Figs. 56 *a–c* are drawn from a specimen, labelled Attaram, obligingly lent to me by the late Miss Linter, of Arragon Close, Twickenham, who informed me that she received it from Mr. Theobald. This was also labelled *P. brachyplecta*, but I had no hesitation in referring it to *P. smithiana*. It measures—major diam. 26; minor 21 mm.; alt. 9 mm.

104. **Plectopylis brachyplecta**, *Benson.*

Helix (*Plectopylis*) *brachyplecta*, Benson, A. M. N. H. ser. 3, xi, 1863, p. 319; Godwin-Austen, P. Z. S. 1874, pl. 74, fig. 8 (armature); Nevill, Hand List, i, 1878, p. 72.
Helix brachyplecta, Hanley & Theobald, Conch. Ind. 1870, pl. 57, figs. 7, 10.
Helix (*Atopa* (*Plectopylis*)) *brachyplecta*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 163, pl. 35, figs. 76, 77, 82, 83.
Plectopylis brachyplecta, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 145; Gude, Science Gossip, N. S. iii, 1897, p. 246, fig. 37 (shell and armature).
Plectopylis (*Endoplon*) *brachyplecta*, Gude, op. cit. vi, 1899, p. 148.

Original description:—" H. testa dextrorsa, late umbilicata, discoidea, obesiuscula, minute arcuato-striata, striis minutissimis spiralibus obsolete decussata, opaca, non nitida, rubescenti-castanea, superne saturatiore, circum apicem succinea; spira planata, apice vix prominente, sutura impressa; anfractibus 6, lente accrescentibus, convexiusculis, ultimo rotundato, superne prope suturam subangulato, antice descendente; apertura obliqua, rotundato-lunari, subauriculata, intus lilacina; peristomate expansiusculo, rufo-castaneo, marginibus remote convergentibus, plica arcuata prominente parietali junctis, lamina longiuscula subascendente e medio plicæ intus recedente, plicis 2 parietalibus remotis verticalibus, quarum externa arcuata internaque curvata, laminis 6 remotioribus palatalibus, quarum superiore et basali tenuibus et 4 medianis incrassatis, foveatis; umbilico lato, concavo.

" Diam. maj. 22, min. 18, axis 8 mill." (*Benson.*)

Hab. Burma: Moulmain (*Gordon*); Attaran Valley (*Theobald*).

The shell is disk-shaped, widely umbilicated, dull reddish chestnut, with amber-coloured apex, paler below, finely and regularly ribbed, and decussated by minute spiral sculpture. It is composed of six or six and a half more or less convex whorls, which increase slowly, the last being rounded and subangulated above, near the suture, and shortly and abruptly descending in front. The aperture is ear-shaped, and the peristome brown, strongly thickened and a little reflected, its slightly converging margins being joined by a thickened curved ridge, which is slightly notched at the junctions above and below. A strong entering flexuous fold is

given off from the parietal ridge, revolving over less than a quarter of a whorl. The parietal armature further consists of two strong, vertical, slightly curved, parallel plates; the anterior one has a short horizontal support posteriorly below, and a strong horizontal ridge anteriorly above; the posterior one gives off on the posterior side two short supports, one above and one below. A short, free horizontal fold occurs below the vertical plates. Fig. 57 *d* shows the parietal wall with its plates and the fold, while fig. 57 *f* gives the anterior view of both parietal and palatal armatures. The palatal armature consists of: first, a thin horizontal fold near the suture; next, four short, broad, oblique, nearly parallel folds, whose lower concave sides face the aperture; finally, a short thin horizontal fold near the lower suture. A little above the second fold and united to its posterior extremity occurs a very short straight fold, while another short, slight oblique fold is found between the posterior ends of the fifth and

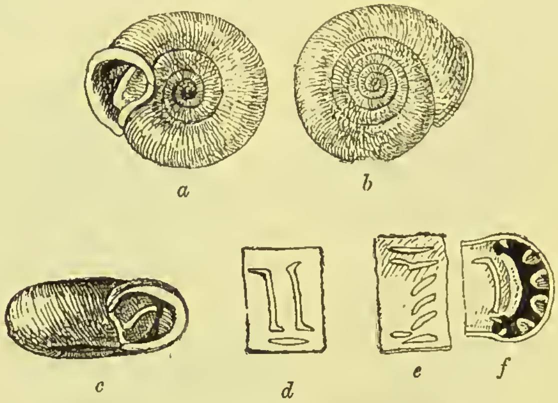


Fig. 57.—*Plectopylis brachyplecta.*

sixth folds. (See fig. 57*e*, which shows the inside of the outer wall with its palatal folds.) Figs. 57 *d–f* are from one of the type specimens from Moulmain in the McAndrew collection of the University Museum of Zoology, Cambridge, the shells having been lent for this purpose by Dr. S. F. Harmer. It measures—major diam. 22, minor 18 mm.; alt. 8 mm.

Among the shells of the genus *Plectopylis* in the British Museum, I found two specimens in the Theobald collection, labelled *Plectopylis clathratula*, Benson, from Balcadua, Ceylon. I am not aware that Mr. Benson ever published this name, but Dr. Pfeiffer described a species belonging to *Ruthvenia*—a section formerly believed to pertain to *Plectopylis*, but now known to have affinity with Endodonts—from Ceylon, under that name. As no species of *Plectopylis* has ever been found in Ceylon, it is probable that there is a mistake in the locality, and it is certain that the name is wrong. Judging from the external resemblances to *Plectopylis*

brachyplecta, I suspected that these shells would prove to pertain to that species, and having obtained permission from Mr. Edgar Smith, the late Assistant Keeper, to open one of the shells, I was enabled to confirm my suspicion, for the armature proved to be identical with that of *P. brachyplecta*. One of these specimens is shown in three different positions in figs. 57 *a–c*. It measures—major diam. 22, minor 18·5 mm.; alt. 8 mm.

IV. Section Plectopylis, s. s., *Gude*.

(Typical section of Benson.)

Science Gossip, n. s. vi, 1899, p. 148.

Sinistral, shell flattened. Palatal armature: one vertical plate with three horizontal folds above, one below.

Type, *Plectopylis bensoni*, Gude.

Range. Burma.

105. Plectopylis ponsonbyi, *Godwin-Austen*.

Helix (*Plectopylis*) *ponsonbyi*, Godwin-Austen, P. Z. S. 1888, p. 243.
Plectopylis ponsonbyi, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 144, pl. 40, figs. 9–12 (shell and armature); Gude, Science Gossip. n. s. iii, 1896, p. 178, fig. 22 (shell and armature).
Plectopylis (s. s.) *ponsonbyi*, Gude, op. cit. vi, 1899, p. 148.

Original description:—" Shell sinistral, widely umbilicated, discoid, solid; sculpture, wavy thread-like lines of growth; colour pale brown; spire flat, 2½ whorls at apex slightly raised above the succeeding whorls; suture very shallow; whorls 7, closely wound and flat; aperture very oblique, descending, horizontally ovate; peristome thickened, reflected, the margins connected by a well-developed ridge, and with slight notches at the inner angles.

" Major diam. 17·5, minor 14, alt. 5 mm." (*Godwin-Austen.*)

Hab. Upper Burma: Hlindet (*Spratt*).

The shell is sinistral, disk-shaped, flattened above, with the apex a little raised, composed of six and a half whorls, closely and regularly coiled, rounded and gradually increasing; it is regularly and finely ribbed, and has the last whorl deflected in front; the parietal callus has a raised flexuous ridge, which is separate above and below from the peristome. From the aperture may be discerned a short, free, slightly curved, parietal fold, which follows the deflection of the last whorl (see fig. 58 *a*). The parietal armature further consists of two strong vertical plates, the posterior one of which is the longer of the two; it gives off posteriorly at the upper extremity a very short horizontal ridge, and at the lower extremity another short, but stronger, ridge, which descends obliquely; the anterior plate is shorter but much stronger and thicker than the posterior one, and it gives off two

strong ridges, one from the upper and one from the lower extremity, gradually decreasing in height. Below these two vertical plates there is a very thin horizontal fold terminating posteriorly a little beyond the posterior vertical plate, and anteriorly becoming attenuated till it is scarcely visible at the parietal ridge, to which, however, it is united. In the figure referred to, I regret to find this horizontal fold is wrongly shown as terminating a little beyond the anterior vertical plate. The palatal armature consists of: first, a thin horizontal lamina, parallel with and near to the suture, a little broader in the middle; secondly, a somewhat stouter lamina, slanting downwards a little posteriorly, also a little broader in the middle, and abruptly decreasing anteriorly, but very slowly posteriorly, where it is slightly indented; thirdly, a similar lamina, slanting a little more posteriorly,

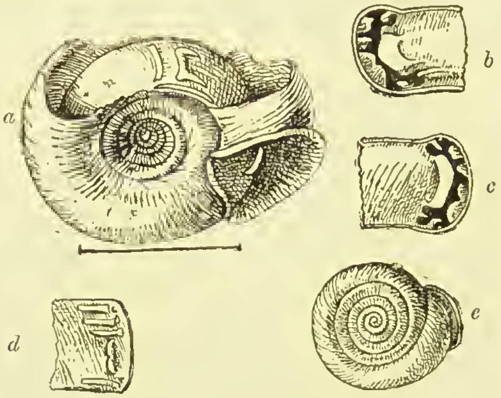


Fig. 58.—*Plectopylis ponsonbyi.*

with a slight indentation; fourthly, a stout bilobed vertical lamina, giving off anteriorly at the upper extremity a very slight ridge and posteriorly from the base of each lobe a short ridge; fifthly, a horizontal fold parallel with and near to the lower suture, raised in the middle, with the apical portion reflexed and angular; it has a very small denticle on the posterior side. Another very small denticle is situated a little below the first horizontal lamina, about its middle, erroneously shown in a line with it in fig. 58 *d*. Fig. 58 *b* shows the whole of the armature from the side of the aperture, fig. 58 *c* the same from behind and fig. 58 *d* the inside of the outer shell-wall with the palatal folds (all magnified); while fig. 58 *e* exhibits the shell restored, from above, natural size. The type specimen is in Mr. Ponsonby's collection and measures 18 mm. in diameter. A specimen sent to me for examination by the late Dr. von Möllendorff, labelled *P. refuga*, proved to pertain to the present species; it measures 21, 17, and 7 mm. respectively, and the fold at the aperture is longer and nearer to the ridge than is the case in the type.

106. Plectopylis lissochlamys, *Gude.*

Plectopylis lissochlamys, Gude, Science Gossip, N. S. iv, 1897, p. 70, fig. 53 (shell and armature); Journ. Malac. vii, 1898, p. 11, fig. 8.

Plectopylis (s. s.) *lissochlamys,* Gude, Science Gossip, N. S. vi, 1899, p. 148.

Original description :—" Shell sinistral, solid, discoid, widely and deeply umbilicated, polished, corneous, finely and regularly ribbed, decussated with minute spiral sculpture above. Suture impressed, apex a little raised, spire depressed. Whorls 7, rounded, increasing slowly, the last twice as wide as the penultimate, widening towards the aperture, but not constricted behind the peristome. Aperture rounded, elliptical; peristome white, rather thin, reflexed; margins a little converging. Parietal callus with a raised flexuous ridge separated from both margins of the peristome by a little notch. Umbilicus wide and deep. Parietal wall with a short, entering, flexuous horizontal fold, which runs close up to the ridge at the aperture, and at one-third of the circumference from the mouth there are two rather thin transverse parallel laminæ descending obliquely backwards, the posterior one longest and with a short ridge posteriorly both at the upper and the lower extremity; the anterior one with a longer ridge anteriorly at the upper extremity, and two short but stouter ridges at the lower extremity, one anteriorly and one posteriorly; below these laminæ occurs a thin horizontal fold close to the lower suture, becoming attenuated but distinctly perceptible at the aperture, where it uuites with the flexuous ridge. Palatal folds 5, the three upper horizontal, thin, the first and second with a denticle posteriorly; the fourth vertical, the upper part deflected anteriorly, the lower part deflected posteriorly, with two denticles posteriorly, one about the middle and one near the lower extremity; the fifth short, horizontal, indented at the middle, with a slight curved denticle posteriorly.

" Diam. major 19–20, minor 16–17 mm.; alt. 6–7 mm." (*Gude.*)

Hab. Burma.

The present species was based upon two unnamed specimens from Burma sent to me by the late Miss Linter. Among a number of *Plectopylis* forwarded to me for inspection by the late Dr. von Möllendorff were two shells labelled *P. refuga* which proved to be identical with Miss Linter's shells. *P. lissochlamys* differs from *P. magna* in being much smaller and shining, as well as paler in colour; in shape and texture it resembles *P. pulvinaris* which, however, is dextral and has a totally different armature. It is allied to *P. ponsonbyi* but is more solid, darker coloured, and more coarsely ribbed, while the last two whorls increase more suddenly, and the last is not constricted behind the peristome as is the case in that species. The two parietal lamiuæ, moreover, are much thinner (see fig. 59 *e*) and the anterior ridges of the anterior lamina are much shorter and slighter; they are parallel,

not convergent as in *P. magna*. A comparison of the figures will indicate differences in the palatal armatures of these two species.

The type specimen is here figured and is in my collection; it measures 19 mm. in diameter. Figs. 59 *a–c* are natural size,

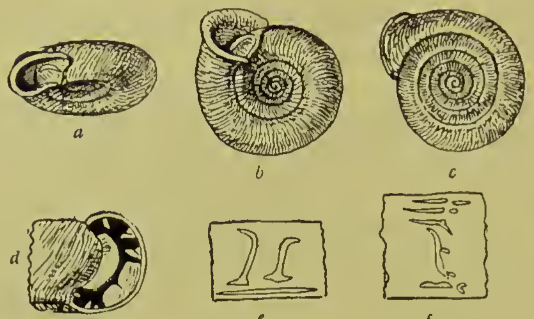


Fig. 59.—*Plectopylis lissochlamys.*

while figs. 59 *d–f* are magnified. Fig. 59 *d* shows the parietal and palatal barriers from the posterior side; fig. 59 *e* a part of the parietal wall with its laminæ and fold; and fig. 59 *f* the inside of the outer shell-wall with its folds and denticles.

107. Plectopylis magna, *Gude.*

Plectopylis magna, Gude, Science Gossip, N. S. iv, 1897, p. 70, fig. 52 (shell and armature); Journ. Malac. vii, 1898, p. 9, fig. 7.
Plectopylis (s. s.) *magna*, Gude, Science Gossip, N. S. vi, 1899, p. 148.

Original description:—"Shell sinistral, solid, discoid, widely and deeply umbilicated, horny brown, finely and regularly ribbed. Suture slightly impressed, spire depressed, apex scarcely raised. Whorls 7½, a little rounded above, tumid below, increasing very slowly, the last widening a little towards the aperture, descending somewhat slowly in front, and a little constricted behind the peristome. Aperture elliptical, peristome white, thickened and reflexed, margins scarcely converging. Parietal callus with a raised flexuous ridge, separated from both margins of the peristome by a little notch. Umbilicus wide and deep. Parietal wall with a short, entering, flexuous, horizontal fold, which terminates at a distance of two millimetres from the parietal ridge at the aperture, and having at one-third of the circumference from the aperture two strong transverse plates; the posterior one the longer, vertical, and a little flexuous, giving off a short, obliquely raised ridge posteriorly above, and a short, strong, obliquely deflected ridge posteriorly below; the anterior one oblique, the upper extremity converging towards the posterior plate, where it gives off posteriorly a short, strong ridge, and anteriorly a strong, longer ridge, which becomes attenuated; at the lower extremity it gives

off two short, strong ridges, one posteriorly and one anteriorly; below these plates occurs a thin fold, close to the lower suture, revolving as far as the aperture, where it unites with the flexuous ridge. Palatal folds 5; the three upper horizontal; the first straight and having an elongated denticle below it at about the middle; the second a little deflected posteriorly; the third short, crescent-shaped; the fourth vertical, flexuous; the fifth horizontal, abruptly deflected anteriorly above and posteriorly below. Posteriorly between the first and fifth folds occur six denticles, placed vertically in a row, the first in a line with the elongated denticle below the first fold, the second a little above and the third a little below the second fold, the fourth in a line with the upper extremity, the fifth near the middle, and the sixth a little below the lower extremity of the vertical fold.

"Major diam. 22·5–25, minor 18·5–21; alt. 8 mm." (*Gude.*)

Hab. Burma: Taunghu, Pegu.

Fig. 60.—*Plectopylis magna.*

Like the last species, the present form was based upon material sent to me by the late Miss Linter and found among a miscellaneous collection of *Plectopylis* from Burma. A shell in the possession of Mr. E. R. Sykes, labelled *P. achatina*, was also referred to this species. Subsequently I discovered two specimens in the late W. T. Blanford's collection, labelled "Taunghu, Pegu; H. F. Blanford." I have also seen two specimens collected by Theobald, which are now in the possession of Mason's College, Birmingham, and which were labelled *P. repercussa*; the latter measure respectively: 23·5, 19·5, 9 mm. and 25, 20, 9 mm.

Plectopylis magna differs from *P. ponsonbyi* in being much larger, more solid, and darker in colour, in having one whorl more, in the

last whorl descending less abruptly, and in the whorls being more rounded. There are also differences in the armature, *i. e.* the two parietal vertical laminæ are convergent above, and the posterior one is considerably longer than the anterior one (see fig. 60 *e*), while in *Plectopylis ponsonbyi* they are almost equal and parallel; the anterior lamina gives off anteriorly below a short, stout ridge, not a distinct fold as in *P. ponsonbyi*, and the thin fold near the lower suture is distinctly continued to the ridge at the aperture, without becoming attenuated; the two upper palatal horizontal folds are much thinner, the third is very short and crescent-shaped, and the vertical fold is not bilobed, while there are several more denticles posteriorly (see fig. 60 *f*, which shows the inside of the outer wall). The type specimen figured is in my collection and measures 25 mm. in diameter, a second specimen measuring 22·5 mm. A third specimen, from the same source, is not quite mature, the ridge on the parietal callus at the aperture not having been formed, but the armature is identical with that of the mature shells. Figs. 60 *a*, *b*, *c*, and *e* are of natural size, while *d* and *f* are magnified.

108. **Plectopylis woodthorpei**, *Gude*.

Plectopylis woodthorpei, Gude, Science Gossip, N. S. vi, 1899, p. 15, fig. 98 (shell and armature).
Plectopylis (s. s.) *woodthorpei*, Gude, tom. cit. p. 148.

Original description :—" Shell dextral, discoid, widely and deeply umbilicated, dark corneous, finely and regularly ribbed, closely decussated by microscopic spiral lines. Spire conical, apex prominent, suture impressed. Whorls 6½, increasing slowly and regularly, flattened above, tumid below, the last scarcely wider than the penultimate, bluntly keeled above the periphery, widening a little towards the aperture, descending deeply in front. Aperture oblique, cordate; peristome whitish, strongly thickened and reflexed, the margins united by a strongly raised flexuous ridge, which is concave in the middle, and notched at the junctions above and below.

" Parietal armature consisting of two nearly parallel vertical laminæ, the posterior one longer, slightly reflected posteriorly at its lower extremity, and provided posteriorly at the upper extremity with a slight ridge; the anterior lamina shorter, giving off a horizontal fold anteriorly at each extremity, the lower less than half the length of the upper, ascending obliquely; the upper revolving almost parallel with the suture, following the deflection of the whorl, and joining the ridge at the aperture. Below the posterior vertical lamina rises a free, thin, horizontal fold, at first considerably elevated above the shell-wall, but suddenly becoming attenuated and thread-like, running parallel with the lower suture, as far as the aperture where it is joined to the ridge on the parietal callus. Palatal armature in two series, the posterior series consisting of: first, a long thin horizontal fold near the suture;

secondly, a very long horizontal fold, extending anteriorly beyond the folds of the second series, with an elevated compressed denticle posteriorly; thirdly, a very short horizontal fold, deflected posteriorly; fourthly, a strong vertical lamina, with an indentation at the middle, giving off posteriorly at its lower extremity an obliquely descending ridge, and provided at the same place with a small denticle; at the base of the upper lobe of the vertical lamina on the posterior side occurs a slight swelling, while on the same side from its upper extremity runs a short ridge, connecting this

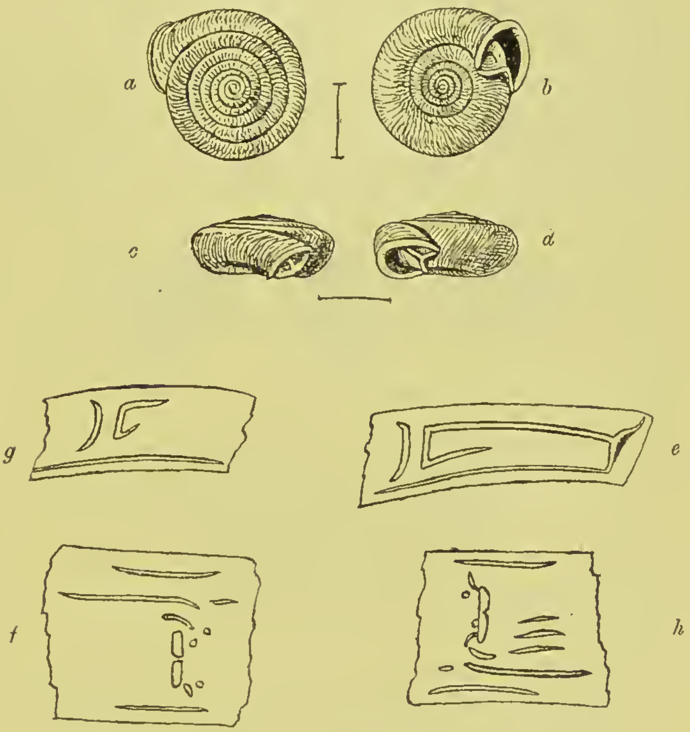


Fig. 61.—*Plectopylis woodthorpei.*

lamina with the third horizontal fold; fifthly, a long thin horizontal fold near the lower suture. The anterior series consists of three thin horizontal folds, the first longest the third shortest, all three descending a little anteriorly." (*Gude.*)

Major diam. 8·75–10, minor 7·25–8 mm.; alt. 3·25–4 mm.

Hab. Burma: Fort Stedman (*Woodthorpe*).

Three specimens—two mature, one young—collected by the late Col. Woodthorpe, R.E., after whom the species is named, were communicated by Lt.-Col. Godwin-Austen and are now in

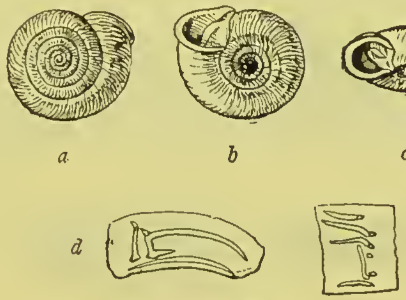
the British Museum. The species is a very interesting one, forming as it does a connecting link between the two sections *Chersaecia* and *Plectopylis* s. s. On the one hand it resembles *P. ponsonbyi* in the posterior portion of the palatal armature (see fig. 61 *f*), and *P. leucochila* in the parietal barriers (see fig. 61 *e*); it differs, however, from the other members of this group in having a series of horizontal folds anteriorly to the vertical palatal lamina. On the other hand this biseriate character of the palatal armature unites it with the group of *P. plectostoma*. In outward appearance the shell of *P. woodthorpei* much resembles *P. shiroiensis* but it is much larger. The immature specimen referred to, which has nearly six whorls formed, has the armature incomplete, and is instructive as possibly throwing some light upon the evolution of these structures. The parietal armature here possesses the two vertical laminæ, but the horizontal folds given off by the anterior lamina are very short, being only one-quarter of the length of those in the mature shells; the thin fold near the lower suture is not compressed into a lamellar fold below the vertical laminæ, as is the case in the full-grown shells, and it rises much farther back (see fig. 61 *g*, which shows portion of the parietal wall with its armature). Of the palatal armature, only the posterior series of processes is present, the anterior series having still to be formed; a fact clearly pointing to the more recent origin of the biseriate forms. The vertical lamina is distinctly divided into two subequal portions, in consequence of the indentation in the middle being carried down to the base of the lamina; the ridge connecting the upper extremity of the vertical lamina with the short horizontal fold above it is absent, but in its stead occurs near the latter a little denticle, while posteriorly to the upper half of the vertical lamina is found a distinct denticle, corresponding to the slight swelling in the same place, mentioned in the diagnosis (see fig. 61 *h*, which shows the inside of the palatal wall with its armature).

109. Plectopylis leucochila, *Gude.*

Plectopylis leucochilus, Gude, Science Gossip, N. S. iv, 1898, p. 231, fig. 66; ibid. p. 264 (*leucochila*).
Plectopylis (s. s.) *leucochila*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell sinistral, rather solid, discoid, deeply and perspectively umbilicated, pale yellowish corneous, finely and regularly ribbed, ornamented with minute spiral sculpture. Suture almost linear, spire depressed, apex scarcely raised. Whorls seven to seven and a half, a little rounded above, rather tumid below, increasing slowly and regularly, the last descending abruptly and rather deeply in front. Aperture roundly oval; peristome white, a little thickened and strongly reflexed, the margins a little converging; parietal callus with a slightly raised flexuous ridge, separated from both margins of the peristome by a little notch. Umbilicus deep, widely perspective.

Parietal wall with two transverse oblique laminæ converging upwards, the posterior one rather thin, slightly sinuous, and having a short ridge posteriorly at the upper and lower extremities, the anterior one shorter, but much stronger and stouter, having an ascending ridge posteriorly above and a short stout support posteriorly below; on the anterior side are found two strong horizontal folds, the lower stout and short and becoming suddenly attenuated; the upper fold long, rather thinner, following the deflection of the last whorl and terminating close to the ridge at the aperture, but not being united to it; a very thin horizontal fold rises below the transverse laminæ close to the lower suture, runs parallel with it, and terminates at the ridge at the aperture. Palatal folds, 5: the first near the suture, straight and nearly horizontal; the second a little more oblique and deflected posteriorly; the third nearly horizontal, but more deflected posteriorly; all three have a slight indentation near the posterior extremity forming a bead-like termination; the fourth is vertical, deflected a little anteriorly above and posteriorly below, having posteriorly



a *b* *c* *d* *e*

Fig. 62.—*Plectopylis leucochila.*

a small denticle near the lower extremity and another about the middle; the fifth is near the lower suture, horizontal and deflected at both extremities." (*Gude.*)

Major diam. 15–17, minor 12–14 mm.; alt. 6–7 mm.

Hab. Burma.

Five specimens received from Mr. Fulton as *P. leiophis* proved upon examination to be distinct, and to belong, in fact, to a different section of the genus.

Plectopylis leucochila is allied to *P. ponsonbyi*, but differs from it in the more raised spire and in having a deeper and more perspective umbilicus. In the armature it differs from the other members of the group of *P. ponsonbyi* in having the upper parietal fold uninterrupted. Figs. 62 *a–c* show the shell in three different aspects, natural size, while figs. 62 *d* and *e* are enlarged; the former shows the parietal wall with its laminæ and folds, and the latter the inside of the outer wall with the folds and denticles.

A specimen in the Blanford collection, labelled "H. F. Blanford," I refer to this species.

110. **Plectopylis feddeni**, *Blanford.*

Helix (Plectopylis) feddeni, Blanford, J. A. S. B. xxxiv, 1865, p. 75; Godwin-Austen, P. Z. S. 1874, p. 611, pl. 74, fig. 7 (parietal armature); Nevill, Hand List, i, 1878, p. 71; Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 47.
Helix feddeni, Hanley & Theobald, Conch. Ind. 1875, pl. 131, figs. 1–3.
Helix (Atopa (Plectopylis)) feddeni, Tryon, Man. Conch. ser. 2, iii, 1887, p. 163, pl. 35, figs. 84–87.
Plectopylis feddeni, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 145; Gude, Science Gossip, N. S. iv, 1897, p. 171, fig. 64; vi, 1899, p. 76, fig. 104.
Plectopylis (s. s.) *feddeni*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell sinistrorse, very widely umbilicated, discoid, flat above, thin, dull white, marked by rather irregular oblique sculpture both above and below. Spire quite flat, apex not rising above the surface, suture impressed. Whorls $6\frac{1}{2}$–7, narrow and closely wound, slightly convex above; the last much broader, rounded at the periphery aud beneath, descending

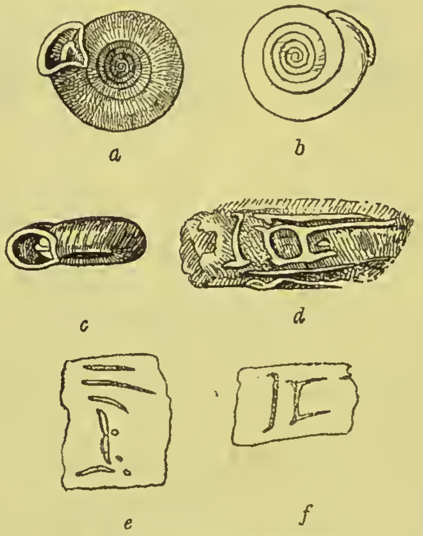


Fig. 63.—*Plectopylis feddeni.*

abruptly close to the mouth. Umbilicus shallow, exposing all the whorls. Aperture more nearly horizontal than vertical, subcircularly lunate. Peristome slightly thickened, expanded throughout, margins joined by a rib, from the centre of which a lamina sometimes runs up to the parietal plication, but is frequently interrupted a short distance within the aperture, and is always thicker and higher near the mouth than farther back. Parietal plication consisting of a vertical lamina in front, and a second, slightly oblique, just behind; the first giving out the interrupted lamina running to the aperture from the top, and a

shorter horizontal lamella from the bottom; the hinder with small re-entering supports above and below. Beneath both is a narrow free thread-like horizontal lamella. Palatal teeth 5: 1st, 2nd, 3rd, and 5th horizontal, 4th vertical and stouter than the others; 1st and 2nd longer than the remainder." (*Blanford.*)

Major diam. 16, minor 13 mm.; alt. 4·5 mm.

Hab. Burma: Prome (*Fedden, Blanford, Hungerford, Fea*); Thyet-Myo (*Blanford*).

111. Plectopylis cairnsi, *Gude.*

Plectopylis cairnsi, Gude, Science Gossip, N. S. v, 1898, p. 171, fig. 90 (shell and armature).
Plectopylis (s. s.) *cairnsi*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell sinistrorse, discoid, solid, widely umbilicated, yellowish corneous, finely and regularly ribbed, and decussated with microscopic spiral lines. Spire depressed, apex scarcely prominent, suture distinctly impressed; whorls $5\frac{1}{2}$, tumid above, rounded below, increasing slowly and regularly, the

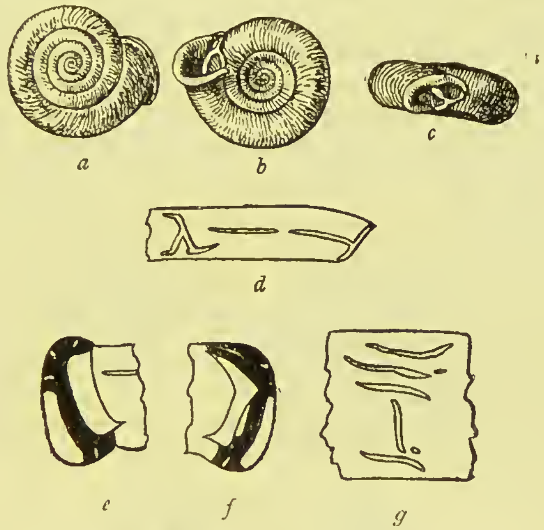


Fig. 64.—*Plectopylis cairnsi.*

last descending moderately in front; aperture oblique, cordate, a little inflexed at the upper outer margin. Peristome white, strongly thickened and reflexed; the margins united by a strong raised flexuous ridge on the parietal callus, notched at the junctions above and below. Parietal wall with a strong median fold given off from the apertural ridge, revolving round about a quarter of the last whorl, but interrupted at the middle; near its posterior extremity occurs a branched fold in the form of the Greek letter λ, *i. e.* an obliquely ascending fold, having anteriorly

at its lower extremity a slightly ascending ridge and posteriorly a short support; it is deflected horizontally at its upper extremity, and at about its middle it gives off an obliquely descending arm, which deflects horizontally at its lower extremity. Palatal folds five: the first, thin, horizontal, near the suture, a little indented and reflexed opposite the upper extremity of the oblique parietal fold; the second, horizontal, a little shorter and deflected posteriorly, provided with a small denticle a little above its posterior extremity; the third, still shorter, but broader, horizontal, crescent-shaped, its concave side towards the fourth, which is vertical, very strong, inclined towards the aperture; near its lower extremity on the posterior side occurs a minute denticle; the fifth is horizontal, short and very thin." (*Gude.*)

Major diam. 18·5, minor 15·5 mm.; alt. 6 mm.

Hab. Probably Burma.

P. cairnsi is flatter and more rounded in outline than *P. bensoni*; the whorls are more rounded and not angulated, the last whorl widens less at the aperture, the suture is more impressed, the umbilicus less deep, and the peristome is white. The parietal armature differs from that of *P. bensoni* and its allies in the median fold being interrupted in the middle and separated from the branched portion which is in the form of the Greek letter λ, and in the total absence of the horizontal fold near the lower suture (see fig. 64 *d*, enlarged, which shows the parietal wall with its folds). In the palatal armature there are also some minor differences: the first horizontal fold is indented opposite the upper arm of the branched parietal fold, a feature I have not observed in any other species; the vertical plate is also much narrower than in *P. bensoni*, leaving more space for the soft parts of the animal to emerge (see fig. 64 *e*, which shows both armatures from the anterior side, and fig. 64 *f*, from the posterior side, both enlarged); and, finally, the denticle behind the fifth horizontal fold, present in every other known species of the group of *P. bensoni*, is absent (see fig. 64 *g*, enlarged, which shows the inside of the outer wall with the palatal armature *in situ*). The figures are all based on the type which is in my collection.

112. Plectopylis cyclaspis, *Benson.*

Helix catinus, Benson, A. M. N. H. ser. 3, iii, 1859, p. 185 (non *H. catinus*, Pfeiffer, 1856).
Helix cyclaspis, Benson, tom. cit. p. 273; Hanley & Theobald, Conch. Ind. 1870, pl. 13, fig. 10.
Helix (Plectopylis) cyclaspis, Benson, op. cit. v, 1860, p. 245; Godwin-Austen, P. Z. S. 1874, pl. 74, fig. 10 (palatal armature); Nevill, Hand List, i, 1878, p. 72.
Helix (Atopa (Plectopylis)) cyclaspis, Tryon, Man. Conch. ser. 2, iii, 1887, p. 164, pl. 35, fig. 9.

Plectopylis cyclaspis, Stoliczka, J. A. S. B. xl, 1871, p. 222, pl. 15, figs. 4–6 (anatomy etc.); Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 144, pl. 42, figs. 34–36 (anatomy etc.); Gude, Science Gossip, N.S. iii, 1897, p. 244, fig. 34 (shell and armature).
Plectopylis (s. s.) *cyclaspis*, Gude, op. cit. vi, 1899, p. 148.
Helix revoluta, Pfeiffer, Malak. Blätt. xiv, 1867, p. 64.

Original description:—"Testa sinistrorsa, late umbilicata, lenticulari-depressa, lævigata, superne demum oblique rugata, fuscescente; spira depresse conoidea, apice obtuso, sutura marginata; aufractibus $7\frac{1}{2}$ lente crescentibus, superne planulatis, ultimo non descendente, acute carinato, carina compressiuscula, basi convexa, circa umbilicum profundum perspectivum subangulata; apertura perobliqua, rotundato-lunari, peristomate expanso, reflexo, superne prope carinam prominente, angulato, marginibus lamina valde elevata lamellam breviter intrantem emittente junctis.

"Diam. maj. 18, minor 16, axis $6\frac{1}{2}$ millim." (*Benson.*)

Hab. Burma: Moulmain (*Theobald, Stoliczka*); Damsang and Rissom Peak (*Godwin-Austen*).

A well defined species which may at once be separated from all its congeners by the keeled periphery. *Helix revoluta* was described by Pfeiffer as from the Andaman Islands. Unfortunately, I have been uusuccessful in tracing the whereabouts of the specimens from which the diagnosis was drawn up, as Mr. Smith, who kindly searched the collection in the British Museum, has been unable to find them there; and the late Professor Boettger informed me that they are not iu the Pfeiffer collection acquired

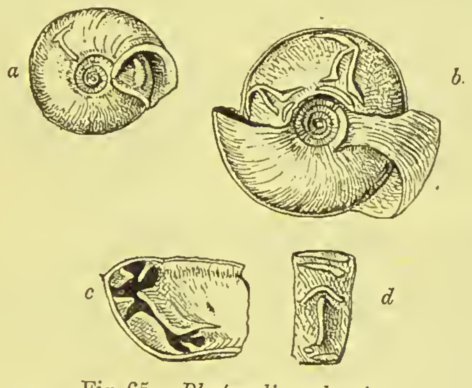


Fig. 65.—*Plectopylis cyclaspis.*

by Dr. Dohrn. This is all the more to be regretted as no *Plectopylis* has since been discovered in the Andaman Islauds. The late Mr. Stoliczka (J. A S. B. xl, 1871, p. 223) was of opinion that this shell could hardly be distinct from *Plectopylis cyclaspis*, his specimens of which agreed perfectly with the measurements given by Dr. Pfeiffer. He adds that amongst many thousands of shells from the Andaman Islands, he never received *P. cyclaspis* and he

doubted its occurrence there as much as that of *P. bensoni*, recorded by Tryon in Proc. Asiat. Soc. 1870, p. 88.

The peristome of *P. cyclaspis* is thickened and reflexed and its margins are united by a raised ridge; the parietal callus bears a short, strong, horizontal, entering fold, visible in its entirety from the aperture (see fig. 65 *a*). The parietal armature consists of a strong and very complicated ramified lamina, which ascends obliquely from the side of the aperture near to the suture, where it bifurcates, one arm—the upper one—ascending a little, then proceeding horizontally and finally becomes attenuated; the lower and stronger one descends obliquely at an angle of 45° for about half its length, then deflects almost vertically and gives off posteriorly at its base a short strong support. The lower extremity of the main lamina also gives off anteriorly a short strong support. Below the lamina is a free, short, horizontal fold. The specimen shown with the outer wall removed in fig. 65 *b* is not quite mature, and it possesses the former barrier, which is evidently in course of absorption, as the second descending arm has almost disappeared, and the lower free fold is also very slight.

The palatal armature consists of five folds: the first thin, near to and almost parallel with the upper suture; the second, broad and flexuous, descending obliquely posteriorly, half above and half below the peripheral keel; the third also broad and somewhat crescent-shaped; the fourth very strong, broad, and vertical, and intercalating with the main stem and lower branch of the parietal lamina; the fifth thin, horizontal, and parallel with the lower suture. Fig. 65 *c* shows the parietal and palatal barriers from the anterior side, while fig. 65 *d* exhibits the inside of the outer wall with its palatal folds. At the base of the vertical palatal fold on the right side—*i. e.* posteriorly—occurs a small denticle, shown erroneously on the left side. Fig. 65 *a* shows a mature specimen, and is of natural size; the other figures are all magnified. Both specimens are from Moulmain and are in Mr. Ponsonby's collection. The mature shell measures; major diam. 17, minor 14·5, alt. 7 mm.

113. Plectopylis karenorum, *Blanford.*

Helix (Plectopylis) karenorum, Blanford, J. A. S. B. xxxiv, 1865, p. 73; Godwin-Austen, P. Z. S. 1874, pl. 74, fig. 5 (shell and armature).

Helix karenorum, Pfeiffer, Novit. Conch. ser. 1, iii, 1869, p. 503, pl. 108, figs. 16–18; Hanley & Theobald, Conch. Ind. 1870, pl. 13, fig. 6.

Helix (Atopa (Plectopylis)) karenorum, Tryon, Man. Conch. ser. 2, iii, 1887, p. 164, pl. 35, figs. 96–100.

Plectopylis karenorum, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 145; Gude, Science Gossip, N. S. iii, 1887, p. 244, fig. 35.

Plectopylis (s. s.) *karenorum*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"Shell sinistrorse, very widely umbilicated, discoid, flat above, solid, white, with rather irregular oblique

pale chestnut streaks crossing the whorls, transversely and sinuously striated with decussating spiral lines above and below; epidermis thin, horny. Apex minutely granulate or sub-granulate, almost imperceptibly raised above the flat spire; suture not impressed, very narrowly marginate. Whorls 6, narrow and closely wound, flat above; the last angulate above the periphery, rounded beneath, descending close to the mouth, very slightly compressed behind the same. Umbilicus very shallow, exposing all the whorls, aperture diagonal, truncately subcircular; peristome white, reflexed throughout, margins joined by a raised bar, from the centre of which a lamina passes up the parietal side of the whorl to the plication, which lies at about $\frac{1}{4}$ the circumference of the whorl from the mouth, and resembles that of *Helix achatina*, Gray; the parietal transverse lamina being simple aud oblique above, then bifurcating, giving off the lamina which runs to the mouth, and two short basal supports. A thread-like lamina also runs along the extreme base of the parietal side of the whorl, and joins the aperture. Palatal teeth 5, the upper 3 and the lowest longitudinal, the uppermost very long and thin, the 4th vertical, corresponding to the fork in the parietal lamina.

"Major diam. 13–18, minor 11–15 mm.; axis 4–5 mm." (*Blanford.*)

Hab. Burma: Banks of Tsanda Khyoung, near Kaintha village, and Banks of Nungatho Khyoung, Henzada district, Pegu (*Blanford*); Myanoung, Arakan Hills (*Blanford*).

The parietal armature consists of a long horizontal fold, united to the ridge at the aperture, and proceeding parallel with the last

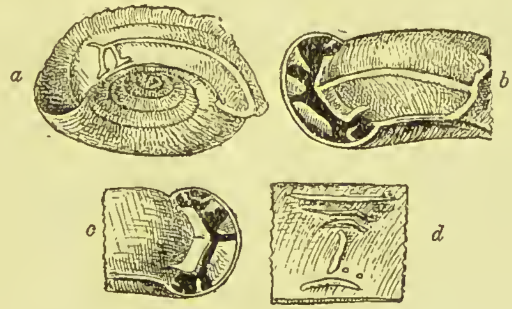


Fig. 66.—*Plectopylis karenorum.*

whorl for a quarter of its length, at which point it gives off a shortly descending arm; it then rises obliquely for a short distance and finally bifurcates, the lower arm of the bifurcation being the longer, and obliquely descending, while the upper arm is slightly curved backwards; the single arm first mentioned has posteriorly at its lower termination a short obliquely descending ridge, and a little higher up anteriorly a stronger obliquely ascending ridge, while the lower arm of the bifurcation has posteriorly at its lower termination

a short obliquely descending ridge (see fig. 66 *a*). Below this complicated plate there is a free, thin horizontal fold close to the lower suture, also united to the ridge at the aperture (see also fig. 66 *b*, which shows both armatures from the side of the aperture, and fig. 66 *c*, which gives their posterior view). The palatal armature consists of: first, a thin and long horizontal fold parallel with and near the suture; secondly, another thin but shorter fold which at first proceeds horizontally, then suddenly deflects posteriorly with a slight curve backwards, a small denticle occurring posteriorly in a line with the main horizontal portion; thirdly, a short, somewhat stouter, crescent-shaped fold, with its concave side facing the aperture and lower suture; fourthly, a strong vertical fold, with two minute denticles posteriorly near its lower end; and fifthly, a thin horizontal fold, slightly deflected in the middle (see fig. 66 *d*, which shows the inside of the outer wall). The specimen figured is in the collection of Mr. Ponsonby; it measures 13·5 millim. in diameter.

In looking over the specimens of *Plectopylis* of the McAndrew collection in the University Museum of Zoology, Cambridge, I found three specimens labelled *Plectopylis burmani*, Benson, doubtless a misspelling for *P. burmanica*, one of Mr. Benson's MS. names. On comparing them with *Plectopylis karenorum*, I found them to belong to that species. As I have reason to think that *P. karenorum* exists in some collections under the name of *P. burmanica*, and as, moreover, this name was never, to my knowledge, published by Mr. Benson, I have thought it useful to mention the above fact.

114. **Plectopylis linteræ**, *Möllendorff*.

Plectopylis linterae, Möllendorff, Nachr. Deuts. Malak. Ges. xxix, 1897, p. 28; Gude, Science Gossip, N. S. v, 1898, p. 170, fig. 88.
Plectopylis (s. s.) *linterae*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"T. sinistrorsa, latissima umbilicata, discoidea, solidula, subtiliter plicato-striata, lineis spiralibus tenuibus decussata, luteoflava, strigis castaneis regulariter variegata; spira vix prominula. Anfractus 6 lente accrescentes, planiusculi, ultimus supra peripheriam subdistincte angulatus, tum convexiusculus, circa umbilicum subangulatus, antice breviter deflexus. Apertura maxime obliqua, oblique cordiformis; peristoma sat expansum, reflexum, valde incrassatum, albo-labiatum, marginibus callo vallido elevato continuis. Lamella parietalis marginem attingens, intus producta, in tertia parte anfractus lamellam transversam duplicatam attingens; lamellæ palatales 4, superne 2 spirales quarum supera longior, tum verticalis 1 longa, denique infera spiralis brevis.

"Diam. 16·5, alt. 6·5 mm." (*Möllendorff*.)

Hab. Burma: Pegu, Moulmain.

The shell is sinistral, solid, discoid, widely umbilicated, pale yellow, transversely streaked and flammulated with chestnut, finely and regularly ribbed, smoother below, decussated with

microscopic spiral lines. The spire is slightly conical, the apex scarcely produced, and the suture linear. Whorls 6, increasing slowly and regularly, a little flattened above and rounded below; the last slightly angulated above the periphery and around the umbilicus, and descending rather abruptly and deeply in front. The aperture is oblique, heart-shaped. The peristome is white, thickened and strongly reflexed; its margins are united by a strong flexuous raised ridge on the parietal callus.

The parietal armature is composed of a slight median horizontal fold, which proceeds from the apertural ridge, is interrupted for a short distance and then continues parallel with the suture for about a quarter of the last whorl; it then gives off a shortly descending, slightly reflexed arm, which is provided anteriorly at the lower extremity with a short horizontal ridge; the fold then

a b c

Fig. 67.—*Plectopylis linteræ.*

rises obliquely for a short distance and finally bifurcates; *the lower arm of the bifurcation is the longer,* and descends obliquely, its lower extremity being provided posteriorly with a short horizontal ridge; the upper arm at first continues to ascend obliquely, then deflects horizontally close to the suture; a short, free, thin, horizontal fold occurs below the two lower arms, not extending beyond on either side (see fig. 68 *d,* which shows the parietal wall with its folds).

The palatal armature consists of: first, a thin long horizontal fold near the suture and parallel with it; secondly, a shorter but stronger broad horizontal fold, which deflects a little and is slightly indented posteriorly; thirdly, a still shorter, broad, straight horizontal fold; fourthly, a strong broad vertical lamina which intercalates between the two lower arms of the parietal fold; this lamina is inclined towards the aperture, and its edge is thickened and reflexed; near its lower extremity on the posterior side occurs a strong little denticle, which is elongated horizontally; fifthly, a short thin horizontal fold close to the lower suture, having an elongated denticle a little above its posterior extremity. The species is closely allied to *Plectopylis bensoni,* but the spire of the present shell is much more raised, the umbilicus is much deeper, and the whorls more rounded. In the armature this species further differs from *P. bensoni* in the median parietal fold being interrupted and much slighter, the branched portion being relatively much more elevated; the lower free horizontal parietal fold is very short, so that this part of the armature, while differing from the typical forms of *P. bensoni,* recalls the condition which

obtains in the var. *breviplica* of that species. The specimen figured, which I received from the late Miss Linter, was labelled with the habitat, "Moulmain." It measures: major diam. 16, minor 13 mm.; alt. 6 mm. Another shell from the same source measures 12·25, 10·5, and 5 mm. respectively.

Var. fusca, *Gude.*

Plectopylis linterae, var. *fusca*, Gude, Science Gossip, N. S. v, 1898, p. 170, fig. 89.

Differs from the type in being unicolorous dark brown, a little paler below, in being thinner in texture, and in the peristome being livid.

Major diam. 14·5–16, minor 12·5–13·5 mm.; alt. 5·5–6 mm.

Hab. Burma.

A shell in Mr. Ponsonby's collection, which was labelled *P. pachystoma*, var. *minor*, I was unable to separate specifically from *P. linteræ*. It differs, however, from the typical form of

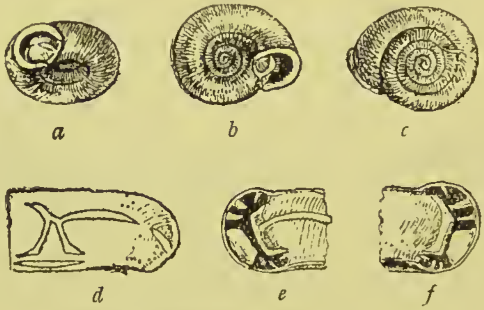


Fig. 68.—*Plectopylis linteræ*, var. *fusca*.

that species in being of a unicolorous dark brown, in the peristome being livid instead of white, and in the shell being thinner in texture. The armatures are identical in both forms. Fig. 68 *d* shows the parietal wall with its folds, while fig. 68 *e* gives the anterior, and fig. 68 *f* the posterior aspect of both sets of barriers (enlarged). Figs. 68 *a–c* show the entire shell (natural size).

Four specimens from the Attaran Valley, in the Theobald collection, British Museum, agree with Mr. Ponsonby's shell, except in size, measuring 16 mm. in diameter.

115. **Plectopylis anguina**, *Gould.*

Helix anguina, Gould, Proc. Boston Soc. Nat. Hist. ii, 1847, p. 218; Hanley & Theobald, Conch. Ind. 1870, pl. 13, fig. 7.
Plectopylis anguina, Stoliczka, J. A. S. B. xl, 1871, p. 218; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 145; Gude, Science Gossip, N. S. v, 1898, p. 75, fig. 79 (shell and armature).
Helix (Plectopylis) anguina, Nevill, Hand List, i, 1878, p. 72.

Helix (*Atopa* (*Plectopylis*)) *anguina*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 165, pl. 35, fig. 6.
Plectopylis (s. s.) *anguina*, Gude, Science Gossip, N. S. vi, 1899 p. 148.

Original description:—"Testa sinistrorsa, distorta, planorboidea, glabra, fusco-castanea; infra radiatim flammulata, vix concava; spira planulata; anfr. 5½ convexiusculis, ultimo ad peripheriam sub-angulato; apertura despecta, perobliqua, semi-elliptica, peristomate rufo, revoluto, callo angulato haud appresso, conjuncto; lamella alba secundum anfractum penultimum intro-volvente.

"Diam. 1 poll. [=25·5 mm.]; alt. ¼ poll. [=6·25 mm.]." (*Gould.*)

Hab. Burma: Manko, Tavoy (*Vinton*); Kuengan (*Theobald*); Sgwagakin, Salween Valley (Coll. *Ponsonby*).

By some authorities this species has been considered identical with *P. bensoni*. It appears, however, to be perfectly distinct.

The shell is sinistral, much flattened, discoid, varying in colour from corneous to dark chestnut; below it is usually paler and

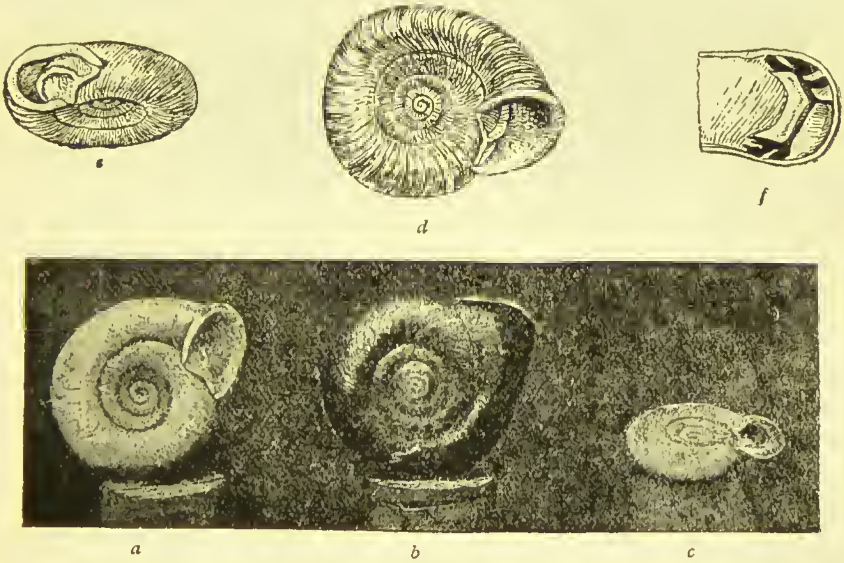


Fig. 69.—*Plectopylis anguina.*

flammulated with dark chestnut; it is finely striated and decussated by microscopic spiral lines. The spire is depressed, the suture linear. Whorls 5½, regularly coiled, increasing slowly and gradually; slightly flattened above and rounded below. The last whorl is slightly angulated at the periphery, widening rather suddenly at the aperture, deeply deflected in front, and somewhat constricted behind the peristome. The umbilicus is extremely shallow; in a specimen in my collection it is only 1·5 mm. in depth. The aperture is nearly horizontal, cordate; the peristome livid or pale brown, a little thickened and much reflexed. A

sinuous raised ridge on the parietal wall at the aperture connects the margins of the peristome; at the junctions above and below, however, there are slight notches. The armature is similar in most respects to that of *P. repercussa*, but it is less solid and heavy; the *lower* arm of the bifurcation on the parietal wall is *longer* than the upper, and the thin free horizontal fold near the lower suture is not united to the ridge at the aperture and *does not proceed beyond the lower arm of the bifurcation* as is the case in *P. repercussa*. The upper fold of the palatal armature is much shorter than in that species, terminating posteriorly at the same point as the shorter upper arm of the parietal bifurcation; the second and fifth horizontal palatal folds are much shorter anteriorly than in *P. repercussa*; while the vertical palatal lamina (the fourth) is broader, but less stout and less inclined towards the aperture than in that species.

The specimen shown in figs. 69 *d* and *e* is from Moulmain and is in my collection. It measures: major diam. 28, minor 22, alt. 7·5 mm. Fig. 69 *f* shows the posterior aspect of its parietal and palatal armature. Figs. 69 *a–c* are reproduced from photographs (natural size) of Gould's types in the New York State Museum, Dr. Bagg having supplied the following notes: "*Helix anguina*, Gould. Catalogue number, 251; Original number, A 558. The shell is somewhat banded by brownish and white alternating, but not in all specimens."

116. **Plectopylis bensoni**, *Gude*, nom. mut.

Helix achatina (Gray), Pfeiffer, Zeits. Malak. ii, 1845, p. 86; Benson, A. M. N. H. ser. 3, iv, 1859, p. 59; Kobelt, Ill. Conch. Buch, ii, 1879, pl. 71, fig. 9.

Helix (Plectopylis) achatina, Benson, A. M. N. H. ser. 3, v, 1860, pp. 244, 245; Nevill, Hand List, i, 1878, p. 71; Godwin-Austen, P. Z. S. 1874, pl. 74, fig. 6 (armature); J. A. S. B. lxiv, 1895, pl. 7, fig. 5 (animal); Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 47.

Helix (Atopa (Plectopylis)) achatina, Tryon, Man. Conch. ser. 2, iii, 1887, p. 165, pl. 35, figs. 3–5, 7, 8.

Plectopylis achatina, Stoliczka, J. A. S. B. xl, 1871, p. 221, pl. 15, figs. 1–3 (anatomy); Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 145; Gude, Science Gossip, N. S. v, 1898, p. 114, figs. 80–82.

Plectopylis (s. s.) *achatina*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"T. sinistrorsa, latissima umbilicata, depressissima, discoidea, lævigata, superne rufa, albido maculata et flammata, basi pallida; spira plana, medio vix elevatiuscula; anfr. 6½ subplanulati, ultimus a latere subcompressus, antice subito deflexus; apertura subhorizontalis, oblongo-subcircularis; perist. fusculum, undique expansum et reflexum, marginibus lamina prominente, lamellam profuude intrantem emittente junctis.

"Diam. major. 31, minor 24, alt. 8½ mill." (*Pfeiffer.*)

Hab. Burma: Mergui (*Philippi*); Moulmain (*Stoliczka, Theobald, Fea*); Nattoung (*Theobald*); Pha-thinz (*Hungerford*).

The name *Helix achatina* having previously been employed (Potiez & Michaud, Galerie de Douai, i, 1838, p. 68), it is necessary to apply another designation to the shell hitherto known as *Plectopylis achatina*, and I have much pleasure in associating with it the name of the naturalist who created the genus *Plectopylis*.

The shell is sinistrorse, disk-shaped, very widely umbilicated, of various shades of chestnut, usually paler and sometimes flammulated below, irregularly and finely striated. The apex is usually, but not invariably, raised slightly above the plane of the whorls. There are six or six and a half whorls, which increase gradually, and are more or less flattened above and tumid below; the first three and a half are smooth or nearly so, while the next two are

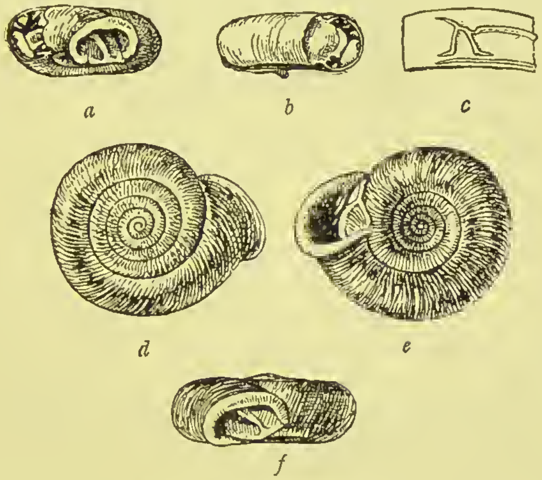


Fig. 70.—*Plectopylis bensoni.*

somewhat coarsely striated and strongly decussated by spiral lines, less distinct on the upper side of the last whorl, obsolete at its side, but reappearing in the umbilical region. The last whorl is bluntly keeled above and subangulated at the periphery; this whorl suddenly widens at the aperture where it is deeply deflected. The aperture is almost horizontal, elliptic cordate, while the peristome is thickened and strongly reflected, livid or purplish-brown in colour, *never white*; the margins are united by a raised sinuous ridge, slightly notched at the junctions above and below. The parietal armature is of the same type as that of *P. repercussa*, but *the lower arm of the bifurcation is the longer of the two* (see fig. 70 *c*, which shows part of the parietal wall with the posterior portion of its armature), and the lower free horizontal fold close to the lower suture *does not reach as far as the apertural ridge, and does not extend beyond the lower arm of the bifurcation and its posterior support.* Fig. 70 *a* gives the anterior

and fig. 70 *b* the posterior aspect of both armatures. The palatal armature is also similar to that of *P. repercussa*, but the first horizontal fold is shorter in the present species correspondingly with the reduction in the upper arm of the bifurcation of the parietal armature, while the vertical lamina is less strong and its edge less thickened. *Plectopylis repercussa* is, generally speaking, a more solid and larger shell, always lighter in colour than *P. bensoni*, while its white peristome will at once distinguish it from the latter species. The lower horizontal parietal fold in *P. repercussa* is always distinctly united to the apertural ridge, whereas in *P. bensoni* this fold is not visible from the aperture. That these characters are constant, I have reason to believe from having opened sixteen or eighteen specimens without finding any variation in these respects. The specimen shown in figs. 70 *a* and *b* measures: major diam. 22, minor 17, alt. 7 mm., while the

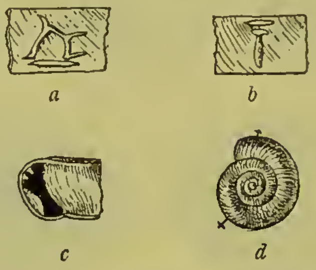


Fig. 71.—*Plectopylis bensoni*, juv.

one shown in figs. 70 *d–f* measures 27 : 21 : 8 mm.; both are from Moulmain, and are in my collection. Another specimen in my collection shows no trace of the ridge at the aperture, but is in all other respects like the mature shells. In figs. 71 *a–d* I have shown an immature shell, received from Mr. J. E. Cooper, of Highgate; it has only four whorls completed, and is only furnished with the posterior portion of the parietal armature (see fig. 71 *a*), but the palatal armature is quite complete, though correspondingly reduced in size; an earlier set of barriers is

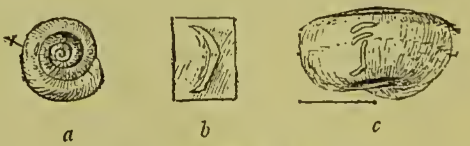


Fig. 72.—*Plectopylis bensoni*, juv.

found three-quarters of a whorl further back; the parietal folds of this set have been entirely absorbed, but of the palatal folds there are only three, the second and third horizontal, and the vertical fold; this is shown in fig. 71 *b in situ*, while its anterior aspect is given in fig. 71 *c*; the two arrows in fig. 71 *d* indicate the respective positions of the two sets of barriers. In the

McAndrew collection, University Museum of Zoology, Cambridge, is a tablet with three shells, labelled "*Nanina lacythis*, type, Benson Coll."; but subsequently altered in pencil to "*P. leiophis* (?)." I refer these specimens without hesitation to immature forms of *Plectopylis bensoni*; one of them is shown in figs. 72 *a–c*. This specimen has four and a half whorls completed, and possesses the immature barriers half a whorl from the aperture. The parietal armature is composed of only a crescent-shaped vertical lamina, corresponding to the upper and lower bifurcation of the main horizontal fold (see fig. 72 *b*), while the palatal armature, as it is seen from the outside through the shell-wall, is shown in fig. 72 *c* (enlarged); there are only three folds, *i. e.* the second and third horizontal ones, which are very short and deflected posteriorly, and the vertical fold, with a posterior ridge or support below; the arrow in fig. 72 *a* indicates the position of this set of barriers. The specimen measures 11 : 10 : 6 mm.; the first three and a half whorls are ribbed, the last whorl only showing spiral sculpture. The cuticle is plaited transversely, and the whorl is angulated above, at the periphery, and below it; the periphery showing traces of a fringe of laciniæ. Below the aperture are found some traces of another set of barriers. The other two specimens referred to measure 9·5 : 8·5 : 5 mm.; the armature is one-half of a whorl from the aperture, and there are traces of an older set one-quarter of a whorl farther back; the upper and the peripheral keels are provided with a fringe of laciniæ. These immature specimens are very interesting and instructive, as they tend to indicate the various stages through which the armatures pass in their evolution from simple to complicated barriers.

Stoliczka remarks (J. A. S. B. xl (1871), p. 221) that *Plectopylis achatina* [*bensoni*] is "extremely common on all the limestone hills about Moulmain. Among thousands of specimens not one dextrorse variety was met with. The larger specimens I have seen measured in the longer diameter 35 millimetres, but specimens of half that size, and even smaller than that, often have all the appearance of being full-grown." As it is so abundant a species, it is not surprising that it is so frequently seen in collections. It is the most variable of all the species of *Plectopylis*.

The following varieties may be distinguished.

Var. repercussoides, *Gude*.

> *Plectopylis achatina*, var. *repercussoides*, Gude, Science Gossip N. S. v, 1899, p. 333.

This variety is intermediate between typical *P. bensoni* and *P. repercussa*, having the contour and the white peristome of the latter, but the armature of the former. It further differs from typical *P. bensoni* in being angulated above at the periphery and below around the umbilicus, a feature it shares with *P. repercussa*.

In colour the shell is chestnut-brown above, while the umbilical region is white, in which it resembles the variety *infrafasciata*. The present variety is based on a shell in my collection, but the Museum of Mason's College, Birmingham, possesses three specimens identical with it.

Var. **infrafasciata**, *Gude*.

Helix achatina, Pfeiffer, Conch.-Cab., Heliceen, i, 1848, p. 382, pl. 66, figs. 28-30; Hanley & Theobald, Conch. Ind. 1870, pl. 57, figs. 8, 9.

Plectopylis achatina, var. *infrafasciata*, Gude, Science Gossip, N. S. v, 1898, p. 133, fig. 84.

Differs from the type in being more rounded in contour, and in the last whorl not widening at the aperture; the umbilicus is more shallow and the peristome more flattened and reflexed; the right margin is a little depressed; the shell is blackish or purplish brown above, with a white or bluish white band below, reaching from the umbilical angulation to the lower suture; the peristome is purplish brown, the left margin being paler.

Major diam. 22, minor 18 mm.; alt. 8 mm.

Hab. Burma: Moulmain; Mergui (*Philippi*).

Plectopylis bensoni, var. *infrafasciata*, is still darker than the

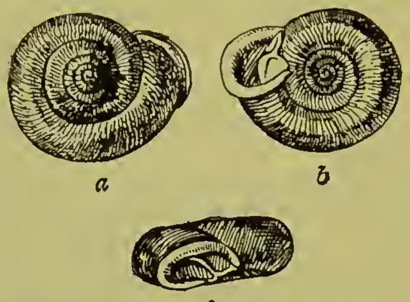


Fig. 73.—*Plectopylis bensoni*, var. *infrafasciata*.

variety *obesa*, being of a blackish or purplish brown. Like that variety it is rounded in contour, but it is larger and more flattened; while the umbilicus is a little more shallow and the peristome more flattened and reflexed than in the type. The peristome is livid purplish in colour, the left margin being paler and the right margin a little inflected. A whitish or bluish-white band below reaches from the umbilical angulation to the lower suture. The armature is similar to that of the type, but the horizontal parietal fold near the lower suture is visible from the aperture and terminates close to the ridge. The specimen figured was received by me from the late Robert Cairns. Four specimens in the collection of the late E. L. Layard and one specimen in the McAndrew collection (the latter labelled "*Plectopylis refuga*") all belong to this form. The late Robert Cairns also sent me for

inspection a specimen measuring 21 mm. in diameter, and four immature shells, in various stages of growth, all showing sets of barriers similar to that of the immature *Plectopylis bensoni* shown in fig. 71 *a*.

Var. castanea, *Gude.*

Plectopylis achatina, var. *castanea*, Gude, Science Gossip, N. S. v, 1898, p. 134, fig. 86.

Differs from the type in being smaller in diameter and proportionately higher; it is darker in colour, being blackish-brown above and a little paler below. It resembles the variety *obesa* in being more rounded in outline, in the last whorl not widening suddenly at the aperture, in the sloping underside, and in the median parietal fold not reaching quite to the apertural ridge; the last $2\frac{1}{2}$ whorls are more strongly decussated above and below than in any other form. An obsolete keel is visible at the periphery.

Major diam. 21, minor 19 mm.; alt. 8 mm.

Hab. Burma.

The variety *castanea* is darker than the other forms of *P. bensoni*

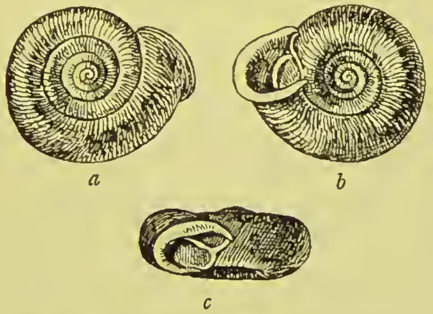


Fig. 74.—*Plectopylis bensoni*, var. *castanea*.

except the variety *infrafasciata*, being of a blackish-brown above, a little paler below. It is, however, larger than that variety, and does not possess the white band below; the umbilicus is also much deeper, the shell being in that respect more like the variety *obesa*, which it also resembles in the sloping underside; the aperture is proportionately larger than in that variety. The spiral lines on the last $2\frac{1}{2}$ whorls are visible without the aid of a lens. The specimen figured was received by me from the late Miss Linter.

Var. obesa, *Gude.*

Plectopylis achatina, var. *obesa*, Gude, Science Gossip, N. S. v, 1898, p. 115, fig. 83.

Differs from the type in being more compressed and higher in

proportion to the diameter; in the last whorl not widening suddenly at the aperture, and in the lower side sloping from the periphery to the umbilical angulation; the right margin of the peristome is depressed; the umbilicus is deeper, and the horizontal median parietal fold does not quite reach the apertural ridge. The shell is darker in colour and more strongly ribbed.

Major diam. 19, minor 15 mm.; alt. 7 mm.

Hab. Burma: Moulmain.

The variety *obesa* is darker in colour than the type, being of a fuscous chestnut. It is more compressed and distinctly ribbed; the shell is higher in proportion to the diameter, and the umbilicus

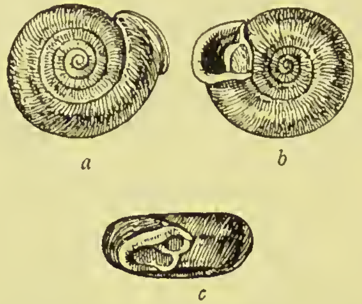


Fig. 75.—*Plectopylis bensoni*, var. *obesa*.

is deeper; the last whorl does not widen suddenly, and the right margin of the peristome is depressed, the aperture being consequently somewhat ear-shaped; the lower side slopes from the peripheral region to the umbilical angulation. The armature does not differ materially from that of the type, except that the median horizontal parietal fold does not quite reach the apertural ridge. Six specimens were received by me from the late Miss Linter, five of these being more or less decorticated.

Var. **venusta**, *Gude*.

Plectopylis achatina, var. *venusta*, Gude, Science Gossip, N. S. V, 1898, p. 134, fig. 85.

Differs from the type and the other varieties in being smaller. It resembles the variety *obesa* in the deeper umbilicus, in the sloping underside, in the comparative height of the shell, and in the median parietal fold not reaching the apertural ridge, but the last whorl widens more, as in the type. In colour it is pale yellowish-white, flammulated with chestnut above and at the side. The peristome is livid brown, the left margin paler, the right margin a little depressed.

Major diam. 17, minor 14 mm.; alt. 7 mm.

Hab. Burma.

The variety *venusta* is smaller than any form of *P. bensoni* I have seen. It is pale yellowish-white in colour, flammulated with

chestnut above and at the sides. The specimen figured was received by me as *Plectopylis pachystoma*, Theobald; but as I am not aware that this name was ever published I consider it expedient to discard the name altogether. A specimen in the collection of the

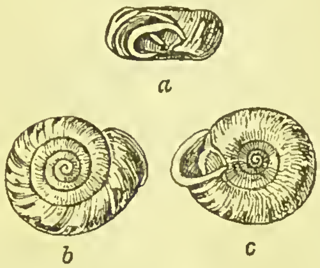


Fig. 76.—*Plectopylis bensoni*, var. *venusta*.

late Dr. von Möllendorff, likewise labelled *P. pachystoma*, I am unable to separate from the present variety, although it shows no flammulation and the peristome is white; in other respects it is identical.

Var. **breviplica**, *Gude*.

Plectopylis achatina, var. *breviplica*, Gude, Science Gossip, N. S. V, 1898, p. 134, fig. 87.

Differs from the type and all the other known varieties by the much more shallow umbilicus. It resembles the variety *infrafasciata* in outline, but it is of a uniform dark brown, with a somewhat polished surface, and the last whorl widens more suddenly at the aperture. The basal horizontal parietal fold is very short, not extending on either side beyond the two lower arms of the main median fold; the first palatal horizontal fold is considerably more elevated than in the other forms, and is bilobed; the second and third horizontal folds are also more elevated, the latter fold has a short fold above its posterior portion; the vertical lamina is also more elevated, and in place of the usual denticle posteriorly to its lower extremity is an elevated ridge, quite united to the plate.

Major diam. 19, minor 16 mm.; alt. 7 mm.

Hab. Burma.

Plectopylis bensoni, var. *breviplica* has a much shallower umbilicus, and is thinner and more fragile than any other form of *P. bensoni* known to me. It is somewhat like the variety *infrafasciata*, but it is devoid of the white band on the lower side; the last whorl also widens a little more than in that variety, but is less deflected, and the aperture is more sloping from top to base; there are also important differences in the armature, the lower horizontal parietal fold being very short, not extending on either side beyond the

two lower arms of the main fold (see fig. 77 *c*, which shows part of the parietal wall with its folds). Of the palatal armature, the first, second, and third folds are more elevated; the first is bilobed, and above the posterior portion of the second occurs a very short additional fold. The vertical lamina is also more elevated, and in

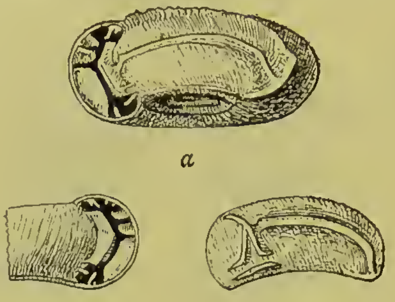


Fig. 77.—*Plectopylis bensoni*, var. *breviplica.*

place of the usual denticle posteriorly to its lower extremity is found an elevated ridge quite united to the plate. Fig. 77 *a* shows the anterior and fig. 77 *b* the posterior aspect of both armatures. The specimen figured is in the collection of Mr. Ponsonby.

117. **Plectopylis repercussa**, *Gould.*

Helix repercussa, Gould, Proc. Boston Soc. Nat. Hist. vi, 1856, p. 11; Hanley & Theobald, Conch. Ind. 1870, pl. 13, fig. 4.
Helix (Plectopylis) repercussa, Stoliczka, J. A. S. B. xl, 1871, p. 218; Nevill, Hand List, i, 1878, p. 72.
Plectopylis repercussa, Gude, Science Gossip, N. S. v, 1898, p. 74, fig. 78.
Plectopylis (s. s.) *repercussa*, Gude, op. cit. vi, 1899, p. 148.

Original description:—"T. sinistrorsa, discoidea, supra planulata, infra concava, plicato-striata et lineis volventibus superne insculpta, castanea; anfr. utroque 6 +, ultimo vix angulato, prope aperturam deflecto; apertura despiciens, oblique lunata, peritremate reflexo, postice callo angulato juncto; lamellis palatinis duabus intro volventibus, quarum una ad angulum inconspicua.

Diam. 1 [=25·5 mm.], alt. $\frac{3}{10}$ poll. [=7·75 mm.]."

Hab. Burma: Tavoy and Mergui (*Benjamin*); Moulmain (*Theobald, Stoliczka*).

The diagnosis by Gould is somewhat vague, and as the species was not illustrated, subsequent authors considered it to be synonymous with *P. bensoni*, from which species, however, it differs in outward appearance as well as in its armature. The shell is sinistrorse, disk-shaped, pale corneous, finely striated, the upper side being strongly decussated by spiral lines, almost

obsolete at the side, but reappearing in the umbilical region. The spire is a little raised, the suture linear. There are seven regularly coiled whorls, which increase slowly and gradually, and are flattened above and tumid below. The last whorl is tri-carinated, one keel being at the periphery, one above, and another below (in young shells these keels are provided with a fringe of coarse hairs); this whorl widens suddenly at the aperture, where it is deeply deflected. The aperture is almost horizontal, elliptic cordate; the peristome white, thickened, and strongly reflected; the margins united by a raised flexuous ridge, slightly notched above and below at the junctions. The parietal armature is very

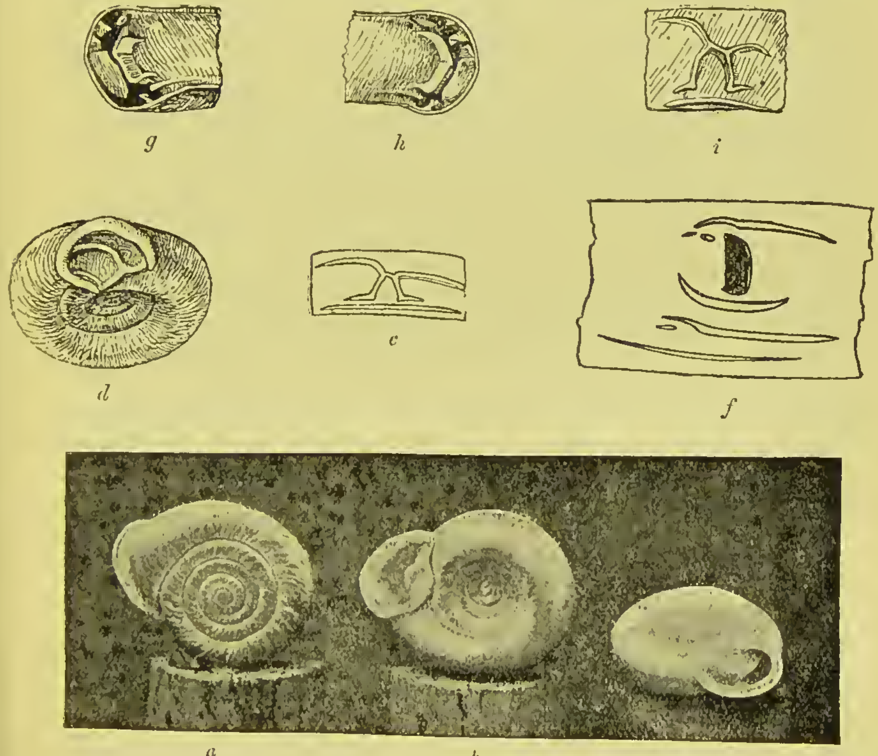


Fig. 78.—*Plectopylis repercussa.*

complicated, being of the same type as in *Plectopylis karenorum.* These two species, together with *Plectopylis bensoni*, *P. anguina*, and *P. linteræ*, form a distinct group, connected with the group of *P. ponsonbyi* by a transition form, *P. cairnsi.* A long, stout, horizontal median fold, given off at the apertural ridge, proceeds parallel with the last whorl for a quarter of the length of that whorl, when it gives off a shortly descending, slightly reflected

arm, provided anteriorly at the lower extremity with a short, abruptly descending horizontal ridge; the fold then rises obliquely for a short distance, and finally bifurcates; *the lower arm of the bifurcation the shorter*, and descending almost vertically; it is provided posteriorly with a short horizontal ridge at its lower extremity; the upper arm at first ascends obliquely, then proceeds horizontally close to the suture, and gradually attenuates. Below these complicated structures, there is a free, thin, horizontal fold close to and parallel with the lower suture, and extending from the aperture to a little beyond the lower arm of the bifurcation and its posterior support (see fig. 78 *e*, which shows part of the parietal wall). At the aperture this fold is *distinctly united to the transverse sinuous ridge* (see fig. 78 *d*). The palatal armature consists of: first, a strong long horizontal fold near the suture and parallel with it, as well as with the posterior portion of the upper arm of the parietal bifurcation, with which it terminates at the same point posteriorly; secondly, a shorter, but much stronger and broader horizontal fold, which deflects with a sharp curve posteriorly, having a little above its posterior termination, and almost in a line with its anterior portion, a slight elongated horizontal denticle; thirdly, a very short, but strong and broad crescent-shaped fold, deflected at both extremities; fourthly, facing the concave side of the last-mentioned fold, is a very strong and broad vertical lamina, strongly inclined towards the aperture, with a much reflected and thickened edge; this lamina intercalates between the two lower arms of the parietal armature; on the posterior side of the lamina and near its lower extremity occurs a stout little denticle, and a little lower and still farther back is found a slight elongated swelling, not amounting to a fold or denticle (yet present in all four mature specimens, as well as in an immature one, examined by me); fifthly, a thin horizontal fold, the anterior part straight, but curved in the posterior half, with the concave side facing the vertical lamina (see fig. 78 *f*, enlarged, which shows the inner side of the palatal wall with its folds and denticles). Figs. 78 *g*–*i* (also enlarged) show an immature specimen of 5½ whorls, in Mr. Ponsonby's collection; the armature is almost identical with that of the mature specimens, but the main median parietal fold is very short and does not rise from the aperture, while the denticle in front of the lower part of the palatal vertical lamina is very strongly developed, and it is united to it so as to form a steep ridge. A second set of barriers, identical in every respect except in being a little smaller, occurs in this specimen ¼ of a whorl further back. The mature specimen shown in fig. 78 *d* is also in the collection of Mr. Ponsonby, and measures: major diam. 31, minor 24, alt. 9 mm.; while the immature specimen measures 17 mm. in diameter. Three specimens in my collection measure respectively 29 : 23 : 9 mm.; 25 : 20 : 8·5 mm.; 23 : 18 : 7·5 mm. The types of the species are in the New York State Museum, at Albany, N.Y., and are shown

in figs. 78 *a–c*, which are reproduced from the photograph kindly supplied by Dr. Merrill. The following particulars are taken from Dr. Bagg's notes which accompanied the photographs: "*Helix repercussa*, Gould. Burmah. Catalogue No., 236; original No., A 564. Major diameter, $1\frac{1}{8}$ inch [=28·5 millimetres]; minor diameter, $\frac{7}{8}$ inch [=22 millimetres]; altitude, $\frac{5}{16}$ inch [=8 millimetres]; greatest diameter of aperture, $\frac{7}{16}$ inch [=11 millimetres]." Gould states that the species was taken in the Mergui Archipelago.

Subfamily CAMÆNINÆ.

Genus **CAMÆNA** (*Albers*), *Pilsbry*.

Camæna, Albers, Die Heliceen, 1850, p. 85, in part; Martens, Die Heliceen, ed. 2, 1860, p. 165; Pilsbry, Man. Conch. ser. 2, vi, 1891, p. 197; viii, 1893, p. 265; ix, 1894, p. 101; ibid., Proc. Acad. Nat. Sci. Philadelphia, 1892, p. 398 (anatomy).
Eucochlias, Theobald in Nevill, Hand List, i, 1878, p. 81.

Type, *Helix cicatricosa*, Müller.

Range. Southern China to Burma and southward.

"Shell rather large, varying from depressed-globose or conoidal to elevated and short pupiform; dextral or sinistral, solid, yellow or brown usually encircled by chestnut bands or lines. *Surface closely malleated or wrinkled all over*; whorls about 5–$5\frac{1}{2}$, the upper ones flattened, the last subglobose or carinated; peristome expanded or reflected, its ends not converging, columellar margin dilated over or partly over the narrow umbilicus. The columella is rounded. *The nuclear shell is rather large* (about one-fifth the diameter of the shell), consisting of 2–$2\frac{1}{2}$ whorls, its junction with the aftergrowth marked by a (generally) distinct line. The young shells are acutely carinated.

"Animal having the sole *very indistinctly* tripartite; *lateral edges of foot with no trace of a foot-margin*, sides of foot granulated in irregular pattern, the tail rather long, rounded above, *with an indistinct slightly impressed longitudinal median line*; anteriorly there are a few indistinct longitudinal grooves from mantle to head. Mantle-margin with a small triangular right body-lappet, and a longer left one.

"Jaw arcuate, strong, typically with numerous, strong, separated ribs.

"Dentition: *Central and lateral teeth having the mesocones only developed*, the cusps large, cutting-points small. Marginal teeth with a long, oblique, bifid mesocone united at the base with the ectocone, which becomes bifid on the outer teeth.

"Genitalia: Vestibule short; penis stout, *continued above in an epiphallus, in which the retractor and then the vas deferens is inserted, and terminating in flagellum*; penis corrugated within,

and having a large papilla at its apex. Vagina stout, bound to the body-wall by a band of muscles; duct of the spermatheca long." (*Pilsbry.*)

118. **Camæna noetlingi,** *von Martens.*

Helix (*Camena*) *noetlingi*, von Martens, Nachr. Blatt Deuts. Malak. Ges. xxix, 1897, p. 178.
Helix (*Camæna*) *noetlingi*, von Martens, Arch. Naturges. 1899, p. 32, pl. 4, fig. 1.

Original description :—" T. sinistrorsa, anguste umbilicata, subdepressa, confertim tenuiter striolata, fuscescenti-fulva, unicolor; anfr. 4½, sat celeriter crescentes, priores 1½ læves, supra valde convexi, sequentes leviter convexi, spiram depresse conoideam efficientes, ultimus ad peripheriam subangulato-rotundatus, infra magis convexus. Apertura valde obliqua, lunato semiovata, peristomate expanso, crassiuscule albolabiato, margine supero paulum arcuato, rapide in basalem valde arcuatum transeunte, marg. columellari arcuatim ascendente, superne dilatato et reflexo, umbilici partem tertiam tegente, callo parietali tenuissimo, fauce fuscente.

" Diam. maj. 28, min. 24, alt. 21, apert. diam. 18, lat. obliqua 15 mm." (*von Martens.*)

Hab. Upper Burma; Pyawbwé, Yamettsin District (*Nötling*).

The author states that *Camæna noetlingi* resembles *C. cicatricosa*, but lacks the sculpture of that species. The soft parts were examined by Herr Fr. Wiegmann who stated that they indicate an odontognathous Helicoid with Haplogonous genitalia, agreeing with *Camæna*.

119. **Camæna ochthoplax,** *Benson.*

Helix ochthoplax, Benson, A. M. N. H. ser. 3, vi, 1860, p. 190; Hanley & Theobald, Conch. Ind. 1870, p. 13, pl. 26, fig. 4 (*octhoplax*); Blanford, J. A. S. B. xxxix, 1870, p. 24.
Nanina (*Oxytes*) *ochthoplax*, Tryon, Man. Conch. ser. 2, ii, 1886, p. 129, pl. 43, fig. 30; ? Kobelt, Conch.-Cab., *Helix*, v, 1904, p. 1145, pl. 287, fig. 1.
Helix (*Camæna*) *ochthoplax*, Pilsbry, Man. Conch., ser. 2, vi, 1891, p. 202, pl. 61, figs. 23, 24.
Helix (*Eucochleas*) *ochthoplax*, Nevill, Hand List, i, 1878, p. 81; Godwin-Austen, J. A. S. B. lxiv, 1895, p. 152, pl. 7, fig. 1.
Helix (*Phania*) *ochthoplax*, Martens, Arch. Naturges. lxv, i, 1899, p. 33.
Camæna ochthoplax, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 104.

Original description :—" Testa profunde et anguste subobtecte umbilicata, depressa, superne convexa, subtus convexiore, solidiuscula, oblique rugoso-striata, obsolete granulata, rugis nonnullis obsoletis spiralibus distantibus subtus confertioribus decussata, rufo-castanea; spira valde obtusa, sutura lineari, demum impressiuscula; anfractibus 5 planiusculis, ultimo antice convexiusculo;

peripheria carinata, carina antice mitiore; apertura obliqua, quadrato-lunari, peristomate expanso, albido, marginibus callo tenui arcuato junctis, basali reflexiusculo, incrassato, antice arcuato, columellari brevi, declivi, reflexo, sinuato, umbilicum subtegente.

"Diam. maj. 54, minor 46, axis 26 mill." (*Benson.*)

Hab. India; Moyang, Khasi Hills, and Asaloo, North Cachar (*Godwin-Austen*); Upper Burma: Maingkhwan, Hukong Valley (*Nötling*). Pegu?

The type was said to be from Pegu, but Blanford thought the locality was in all probability erroneous, the shell having never been met with either by Theobald, Fedden, or himself. Nevill places the following note by Blanford on record:—"A true *Helix*, nearly black, with pale tawny markings, surface granulate; jaw grooved."

The species resembles *C. illustris* in its general characters, but is more depressed and umbilicated. The sculpture is less distinct, while the lip is expanded but not reflexed. Pilsbry states that as *C. ochthoplax* is a genuine *Camæna* of the *cicatricosa* type, *Eucochlias* must be regarded as an absolute synonym of *Camæna*.

120. **Camæna saturnia,** *Gould.*

Helix saturnia, Gould, Proc. Boston Soc. Nat. Hist. ii, 1845, p. 98; ibid., Otia Conch. 1862, p. 198; Hanley & Theobald, Conch. Ind. 1870, pl. 25, fig. 3.
Helix (Phania) saturnia, von Martens, Die Heliceen, ed. 2, 1860, p. 157.
Helix (Camæna) saturnia, Pilsbry, Man. Conch. ser. 2, vi, 1891, p. 203, pl. 60, fig. 5.
Hemiplecta? saturnia, Godwin-Austen, Moll. Ind. ii, 1898, p. 73.
Camæna saturnia, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 104.

Original description:—"Testa magna, lenticularis, pallide rubido-cornea, ad peripheriam costato-carinata, late et profunde umbilicata; anfractibus 5 planulati; spira depresso-conica; sutura profunda, marginata; subtus convexa, costulis obsoletis cincta; apertura ampla, rhomboidea, peristomati revoluto."

"Major diam. 47, minor 39, alt. 28 mm.; apert. lat. 20, alt. 15 mm." (*Gould.*)

Hab. Burma: Tavoy (*Mason*); Tenasserim (*Theobald*).

Shell perspectively umbilicated, depressed-conoid, distantly plicate-striate, buff corneous. Spire depressed, suture shallow, apex obtuse. Whorls 4½, granulated, increasing rapidly, sub-planate, slightly sulcate above the suture; the last obtusely keeled, slightly compressed above and below the keel, the latter half becoming more convex above towards the mouth, slightly dilated at the aperture; the base flattened, sloping from the periphery to the umbilicus, becoming more convex towards the mouth, angulated around the deep funnel-shaped umbilicus, and exhibiting

traces of spiral sulci; aperture subrhomboid, peristome pinkish, margins approaching, reflexed, upper and outer curved, basal nearly straight, columellar thickened, strongly reflexed and triangularly dilated over the umbilicus.

The species was originally found at Tavoy, but a specimen is in the British Museum collection, taken by Theobald at Tenasserim. Although this shell is in a worn condition and appears to have been varnished, it has enabled me to amplify Gould's original meagre description. Opinions as to its systematic position have been considerably at variance. Von Martens referred the species to *Phania* [=*Pyrochilus*], and Godwin-Austen to *Hemiplecta*, whereas Pilsbry places it (correctly I think) in *Camæna*. Its nearest ally appears to be *Camæna vanbuensis*, Smith.

A second specimen in the British Museum, forming part of the Cuming collection, is also dead and worn, but has been preserved in its natural condition. The base is ornamented with spiral sulci and the shell is considerably larger than the one in the Theobald collection, measuring:—Major diam. 53, minor 45, alt. 32 mm.

Genus **OREOBBA**, *Pilsbry*.

Oreobba, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 109 (as subgenus? of *Obba*).

Janira, Albers, Die Heliceen, 1850, p. 124; non *Janira*, Leach, 1813 (Crustacea), Oken, 1815 (Acalepha), Schumacher, 1817 (Mollusca).

Type, *Helix codonodes*, Pfeiffer.

Range. Nicobar Islands.

"Shell globose-conoidal, *bullet-shaped*, composed of about 5 whorls which are carinated in mature shells; the embryonal portion not differentiated; last whorl deflexed in front. *Surface shining, microscopically spirally striated*. Aperture truncate-rounded; entire lip well reflexed, at the columella expanded partly over the narrow umbilicus, and armed with a callous tooth on the inner edge." (*Pilsbry*.)

Animal unknown.

121. Oreobba codonodes, *Pfeiffer*.

Helix codonodes, Pfeiffer, P. Z. S. 1846, p. 112; Reeve, Conch. Icon. vii, 1851, pl. 22, fig. 91; Pfeiffer, Conch.-Cab., *Helix*, ii, 1853, p. 232, pl. 111, figs. 15, 16; iii, 1854, pl. 128, figs. 3, 4; Kobelt, Ill. Conchyl. Buch, ii, 1879, pl. 78, figs. 19, 20.

Helix (Janira) codonodes, Albers, Die Heliceen, 1850, p. 124; Nevill, Hand List, i, 1878, p. 115.

Stylodonta (Janira) codonodes, Chenu, Man. Conchyl. i, 1860, p. 451, fig. 3363.

Helicostyla (*Janira*) *codonodes*, Mörch, Journ. Conchyl. xx, 1872, p. 312.
Helix (*Obba*) *codonodes*, Pilsbry, Man. Conch. ser. 2, vi, 1891, p. 236, pl. 53, figs. 8, 9, 10.
Obba (*Oreobba*) *codonodes*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 109, pl. 19, fig. 11.

Original description:—" T. umbilicata, globoso-conoidea, solida, oblique striatula, lineis spiralibus confertis subtilissime sculpta, nitida, alba vel straminea, castaneo 1–2 fasciata; spira campanulata, apice obtusiuscula; anfr. $5\frac{1}{2}$ vix convexi, ultimus antice descendens, basi juxta aperturam gibboso-subconstrictus; apertura obliqua, subquadrangulari-rotundata; perist. incrassatum, reflexum, marginibus subapproximatis, callo nitido junctis, columellari intus protuberantia dentiformi munito, extus dilatato, patente, sinuoso.

"Diam. maj. 20, min. 17, alt. 17 mill." (*Pfeiffer.*)

Hab. Nicobar Islands: Car Nicobar (*Kjellerup*), Camorta, Great Nicobar (*Roepstorff, Wood-Mason, Stoliczka, Philippi*); Kondul (*Roepstorff, Wood-Mason, Stoliczka*).

The species varies considerably in stature, the height of some specimens equalling the major diameter. Mörch describes three varieties: *minor*, *subcylindrica* (height 27 mm.), and *edentula* (height 28 mm.), while Godwin-Austen enumerates in addition: *efasciata*, *subcarinata*, and *albolabris*, all *nomina nuda* of Nevill. Mörch also mentions a unicolorous form from Car Nicobar, which is probably Nevill's *efasciata*.

Genus **PLANISPIRA**, *Beck.*

Planispira, Beck, Index Moll. 1838, p. 29; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 110.

Subgenus **TRACHIA**, *Albers.*

Trachia, (Albers) von Martens, Die Heliceen, ed. 2, 1860, p. 160; Stoliczka, J. A. S. B. xl, 1871, p. 223 (anatomy); Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 114, pl. 32, figs. 44, 45; pl. 34, figs. 4–6; pl. 42, fig. 39 (anatomy).
Eurystoma, Albers, Die Heliceen, 1850, p. 126 (non Rafinesque, 1818).

Type, *Helix asperella*, Pfeiffer.

Range. India, Burma, Ceylon, Mergui Archipelago, Andaman Islands.

" Shell varying from discoidal to depressed-globose, umbilicate, the surface rather roughly sculptured, hairy when young, microscopically granulated, sometimes ribbed when adult; the apex typically showing no distinct sculpture. *Last whorl strongly deflexed in front.* Aperture very oblique, small, the lip well expanded, reflexed below, *the terminations approaching* and sometimes connected by a raised callus.

"Animal (of *P. delibrata*) having the left body-lappet of the mouth represented by a simple thickening; right lappet reaching anteriorly over the back and rapidly becoming narrower below. In *P. vittata* the sole is distinctly tripartite.

"Jaw arcuate, the entire anterior surface ribbed, the seven median ribs stronger. In *P. vittata* there are five very high ribs, strongly denticulating the margin.

"Radula (of *P. delibrata*) very long, with 124 transverse rows of 22 (to 18) 20 . 1 . 20 . 18 (to 22) teeth. Central and inner lateral teeth with a large mesocone and obsolete side cutting-points; outer laterals and marginal teeth with the ectocone developed. In *P. vittata* the formula is about the same; central and inner 14 laterals unicuspid; outer laterals with an ectocone. At the 25th tooth the mesocone becomes bifid, and outwardly the bifid mesocone becomes shorter, the outermost marginals having three subequal cusps.

"Genitalia having the female side free from all accessory organs, the duct of the spermatheca very long. Penis terminating in an epiphallus, near the root of which the retractor is inserted; epiphallus long, terminating in a short flagellum and the vas deferens. The genitalia of *P. vittata* are similar; penis with a spirally coiled flagellum. In *P. penangensis* the penis bears an epiphallus ending in a short flagellum, and has an accessory sack, perhaps an 'appendix.'

"These shells are characterized by the deeply descending whorl at the aperture, and the strongly converging ends of the lip. The anatomy is in essential agreement with either *Chloritis* or *Planispira*, although the strong ribbing of the jaw is most like the former group. On the other hand, the general form of the shell, the deep descent of the last whorl to the very oblique aperture and the system of colouring, agree more nearly with *Planispira*. The sculpture of the shell varies considerably in the different species. The more typical, such as *fallaciosa*, *nilagirica*, *proxima*, as well as *vittata* exhibit an apparently smooth apex; but *propinqua*, *tanqueryi*, and a few others, show an excessively fine quincuncial punctulation of the apical whorls, such as occurs in *Chloritis*, in combination with the characteristic shell contour of *Trachia*. Until we know by the examination of numerous species, how and to what extent the characters of jaw and genitalia are correlated with the above-mentioned shell structures, no consistent zoologist will be justified in drawing rigid lines of demarcation between the *Chloritis* and *Planispiras* of South-Eastern Asia. It is better to recognize frankly that in this area the two groups are represented by some forms which, so far as shell characters show, are undifferentiated or separated by feeble characters only." (*Pilsbry.*)

Stoliczka was of opinion that *fallaciosa*, *ruginosa*, *nilagerica*, *vittata*, *proxima*, and *crassicostata* pertain to *Planispira*, s. s., but Pilsbry refers them, correctly I think, to the subgenus *Trachia* and I have followed him in this respect.

122. **Planispira albicostis**, *Pfeiffer*.

Helix albicostis, Pfeiffer, P. Z. S. 1860, p. 134; Malak. Blätt. vii, 1861, p. 238.
Helix (Trachia) albicostis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 181.
Planispira (Trachia) albicostis, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

Original description:—"T. sublate umbilicata, depressa, tenuis, granulato-rugosa et pilis brevibus obsita, cornea, costulis obliquis albidis munita; spira parum elevata; anfr. 4 convexiusculi, ultimus superne subangulatus, supra angulum leviter sulcatus, antice deflexus; apertura perobliqua, ovalis; perist. tenue, marginibus fere contiguis, supero expansiusculo, basali breviter reflexo.

"Diam. maj. 9½, min. 8, alt. 4⅓ mill." (*Pfeiffer.*)

Hab. India: Ahmednuggar.

The species bears a superficial resemblance to *P. crassicostata*, but in the latter the costæ are much more prominent and more widely spaced, the umbilicus is a little more contracted, and the periphery is acutely keeled, the keel being pinched above and below, and, owing to the strong costæ, it is crenulate, whereas in *P. albicostis* the periphery is simply angulated with a shallow furrow above it. The principal character, however, differentiating the two species is the presence in *P. albicostis* of crowded short hairs, placed on raised tubercles, arranged in rows which obliquely intersect the lines of growth.

123. **Planispira asperella**, *Pfeiffer*.

Helix asperella, Pfeiffer, Symb. Hist. Helic. iii, 1846, p. 78; Reeve, Conch. Icon. vii, 1852, pl. 125, fig. 752; Pfeiffer, Conch.-Cab., *Helix*, ii, 1853, p. 93, pl. 82, figs. 22–25; Hanley & Theobald, Conch. Ind. 1875, pl. 131, figs. 8, 9; Kobelt, Ill. Conch. Buch, ii, 1879, pl. 76, fig. 7.
Helix (Planispira) asperella, Nevill, Hand List, i, 1878, p. 77.
Helix (Trachia) asperella, Martens, Die Heliceen, ed. 2, 1860, p. 160; Tryon, Man. Conch. ser. 2, iv, 1888, p. 62, pl. 14, fig. 58.
Planispira (Trachia) asperella, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116, pl. 19, fig. 25 (shell); pl. 34, fig. 4 (radula).
Helix granifera, Benson, MS.

Original description: — "T. umbilicata, depressa, granulis minutis undique exasperata, sordide albida, fasciis rufis varie cingulata; spira vix elevata; anfr. 4 planiusculi, ultimus basi convexus, antice parum descendens, juxta umbilicum mediocrem, infundibuliformem subcompressus; apertura obliqua, lata, suborbicularis; perist. undique expansum, marginibus approximatis, callo tenui junctis." (*Pfeiffer.*)

Major diam. 13–16, minor 10–13, alt. 6½–8¼ mm.

Hab. India: Bundelkhund (*Benson*); Chanda (*Nevill*).

Resembles *Chloritis propinqua*, Pfr., but may be distinguished by the roughened granules. The bands vary considerably, but the commonest form appears to be one with a dark, well-defined, supra-peripheral band, with two paler linear ones above it and four or five narrower and paler ones below it. Specimens without bands also occur.

124. **Planispira atkinsoni**, *Theobald.*

Helix atkinsoni, Theobald, J. A. S. B. xxviii. 1859, p. 305; Hanley & Theobald, Conch. Ind. 1870, pl. 15, fig. 9, 1874, pl. 84, figs. 2, 3.

Helix (Trachia) atkinsoni, Tryon, Man. Conch. ser. 2, iv, 1888, p. 56, pl. 12, figs. 83–85.

Planispira (Trachia) atkinsoni, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

Original description :—"Testa depressa, infundibuli-forme-umbilicata, lineis transversis rugose striata, lineisque spiralibus obscure leviter decussata, obtuse carinata, sordide albida (forsan in meliore specimine cornea) semitranslucente, sutura impressa. Anfract. 5 convexiusculis, apertura obliqua. Perist. leviter incrassato, non reflexo.

"Diam. 0·54, alt. 0·20." (*Theobald.*)

Hab. Burma: Moulmain (*Atkinson*); Tenasserim (*Beddome*).

A specimen collected at Tenasserim, received from the late Col. Beddome, enables me to supplement the above meagre description, which must have been drawn up from a dead and worn specimen.

Shell moderately umbilicated, lenticular, pale fuscous; suture shallow but well marked; whorls 5, slightly convex, increasing slowly and regularly, the last slightly dilated at the mouth; the apical whorl shining, very finely rugosely striated, the striæ intersected by spiral lines, the transverse striæ becoming more accentuated and the spiral lines becoming deeply incised as the growth of the shell proceeds, the former being cut into sub-quadrate granules by the latter on the later whorls, giving the upper and outer side of the shell a rough rasp-like texture; the spiral incised lines cease somewhat abruptly a short distance below the periphery, and the transverse striæ also almost disappear on the underside, which is therefore almost smooth and shining. Aperture oblique, subquadrate-ovate, margins of the peristome approaching, upper sinuate, inflected, acute, the others slightly thickened and reflexed; outer regularly curved, basal almost straight, columellar ascending; umbilicus funicular.

Major diam. 12, minor 10, alt. 4·75 mm.

The species, if correctly referred to *Trachia*, is a somewhat abnormal member of this group owing to its coarsely granulated upper and lateral surface and the acute inflected upper margin of the peristome.

125. **Planispira contracta**, *Benson.*

Helix contracta (Hutton) Benson, A. M. N. H. ser. 3, xiii, 1864, p. 137; Hanley & Theobald, Conch. Ind. 1870, pl. 55, figs. 8 & 9.
Helix (*Planispira*) *contracta*, Nevill, Hand List, i, 1878, p. 77.
Helix (*Trachia*) *contracta*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 181.
Helix (*Plectotropis* (*Trachia*)) *contracta*, Tryon, Man. Conch. ser. 2, iv, 1888, p. 65, pl. 14, figs. 61, 62.
Planispira (*Trachia*) *contracta*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

Original description:—"H. testa late umbilicata, depressa, discoidea, oblique striatula, lævigata, nitidula, albida, fascia rufescente supra angulum superiorem cincta; spira planata, apice vix elevatiore, sutura impressa; aufractibus 4, sensim accrescentibus, convexiusculis, ultimo supra peripheriam compressiusculo subangulato, antice latiore oblique descendente, subtus convexo, umbilicum mediocrem, medio anguste excavatum, suturaque brevi profunda munitum circumstante; apertura valde obliqua, lata, ovato-lunari; peristomate non continuo, superne expansiusculo, subhorizontali, infra reflexiusculo, marginibus conniventibus approximatis.

"Diam. maj. 13, min. 10, alt. 4 mill." (*Benson.*)

Hab. India: Malwa; Pooree, Bhagulpur (*Raban*); Benares (*Mainwaring*); Delhi, Roorkee (*Wood-Mason*).

Apparently a rare species, intermediate between *P. nilagerica* and *P. asperella.*

126. **Planispira fallaciosa**, *Férussac.*

Helix (*Helicella*) *fallaciosa*, Férussac, Tabl. Syst., Limaçons, 1821, p. 43 (nom. nud.); ibid., Hist. Nat. Moll. 1832, pl. 71, figs. 1–3, Expl. Pl. p. iii (Livr. xxviii).
Helix fallaciosa, Pfeiffer, Symb. Hist. Helic. ii, 1842, p. 27; Deshayes in Férussac, Hist. Nat. Moll. i, 1850, p. 54; Reeve, Conch. Icon. vii, 1852, pl. 85, fig. 459; Pfeiffer, Conch.-Cab., *Helix*, ii, 1853, p. 93, pl. 82, figs. 18–21; Hanley & Theobald, Conch. Ind. 1874, pl. 85, figs. 8, 9.
Helix (*Camæna*) *fallaciosa*, Chenu, Man. Conchyl. i, 1860, p. 455, fig. 3397.
Helix (*Trachia*) *fallaciosa*, von Martens, Die Helic. ed. 2, 1860, p. 160.
Helix (*Planispira*) *fallaciosa*, Nevill, Hand List, i, 1878, p. 77.
Helix (*Plectotropis* (*Trachia*)) *fallaciosa*, Tryon, Man. Conch. ser. 2, iv, 1888, p. 64, pl. 14, figs. 68, 69.
Planispira (*Trachia*) *fallaciosa*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.
Trachia fallaciosa, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 285.

"H. testa orbiculato-depressa, discoidea, lævigata, alba, fusco-zonata; anfractibus planiusculis, ultimo cylindraceo, aliquando

superne obtuse angulato; basi umbilico angusto perforato; apertura ovato-transversa; marginibus albis, reflexis, conjunctis.

"Diam. 17, axis 7 mm." (*Deshayes.*)

The foregoing short diagnosis is amplified, from specimens in my own collection, as follows:—

Shell perspectively umbilicated, depressed-conoid, from whitish to pale or dark fuscous, unicolorous or variously banded with brown. Apex scarcely raised, spire depressed, suture linear. Whorls 4–4½, finely striated, densely and minutely granulated, rather flattened above, subangulated at the periphery, convex below, angulated around the umbilicus; the last suddenly dilated towards the mouth, shortly and abruptly descending in front, constricted below behind the peristome. Aperture ovate-rotundate, margins approaching, united by a thin callus on the parietal wall; peristome rather thin, slightly expanded and reflexed, upper and outer margins curved, basal margin nearly straight, columellar curved, triangularly dilated and slightly overhanging the umbilicus, which shows nearly half of the penultimate whorl.

Major diam. 11–15·5, minor 9–12·5, alt. 5·5–8 mm.

Hab. India: Coimbatore (*Leschenavlt*); Trichinopoly (*Blanford*). Ceylon (*Templeton, Blanford, Nevill*).

An elegant species, apparently not uncommon. It is unicolorous or variously ornamented with bands; the commonest form seems to be the one with a rather broad supra-peripheral band, one or two narrow ones above and several (five or six) below it; occasionally a broad infra-peripheral band occurs.

127. Planispira crassicostata, *Benson.*

Helix crassicostata, Benson, A. M. N. H. ser. 2, ii, 1848, p. 159; Reeve, Conch. Icon. vii, 1852, pl. 125, fig. 747; Hanley & Theobald, Conch. Ind. 1870, pl. 50, fig. 10.
Helix (Planispira) crassicostata, Nevill, Hand List, i. 1878, p. 77.
Helix (Trachia) ruginosa, var. *crassicostata*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 181.
Helix (Plectotropis (Trachia)) ruginosa, var. *crassicostata*, Tryon. Man. Conch. ser. 2, iv, 1888, p. 64, pl. 14, fig. 67.
Planispira (Trachia) ruginosa, var. *crassicostata*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

Original description:—"T. late umbilicata, depresso-planata, albida, plicis validis irregularibus obliquis, juxta carinam incrassatis, munita; spiræ apice lævigato, vix elevato; anfractibus 4 planatis, ultimo carinato, subtus valde convexo, antice deflexo; umbilico infundibuliformi; apertura subhorizontali, transverse ovato-rotundata, marginibus conniventibus reflexis, callo brevi junctis.

"Diam. maj. 13, min. 10, axis 4 mill." (*Benson.*)

Hab. India: S. India (*Jerdon*); Poona (*Blanford, Fairbank*).

128. **Planispira colletti**, *Beddome.*

Helix (Planispira) colletti, Beddome, P. Z. S. 1891, p. 314, pl. 29, figs. 7–9.
Chloritis (Trichochloritis) colletti, Pilsbry, Man. Conch. ser. 2, viii, 1893, p. 274, pl. 51, figs. 36–38; ix, 1894, p. 124.

Original description :—" Shell openly umbilicate, orbiculato-depressed, rather thin; spire nearly flat; whorls 5, the last obsoletely angulate at the periphery, not descending, very prominently and coarsely striated obliquely; colour light fawn, with a dark band at the periphery; aperture somewhat oblique, lunately suborbicular; peristome simple, very slightly reflexed, margins not joined." (*Beddome.*)

Major diam. 19, minor 16, alt. 9·5 mm. Width of umbilicus 5 mm.

Hab. Burma: Shan States (*Boxall*).

129. **Planispira footei**, *Stoliczka.*

Trachia footei, Stoliczka, J. A. S. B. xlii, 1873, p. 170.
Helix footei, Hanley & Theobald, Conch. Ind. 1875, pl. 149, fig. 10.
Helix (Planispira) footei, Nevill, Hand List, i, 1878, p. 77.
Helix (Plectotropis (Trachia) footei, Tryon, Man. Conch. ser. 2, iv, 1888, p. 64, pl. 14, fig. 84.
Planispira (Trachia) footei, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

Original description :—" Trachia testa albida, orbiculata, supra deplanata, infra inflata, versus medium angustata, perspective modice umbilicata, undique dense granulifera; anfractibus 4 ad 4·5, gradatum accrescentibus, primis duobus aut tribus convexiusculis, transversim striatis, cæteris magis deplanatis, transversim costulis inæqualibus et obliquis ornatis, ultimo ad peripheriam valde carinato, costulis in carina evanescentibus, ad aperturam valde descendente atque fere omnino deflexo; basi circa umbilicum rotundate subangulata, similariter costulata, costulis usque ad peripheriam extensis; apertura fere horizontaliter deflexa, margine dilatato fere undique libero, ad angulum umbilici angustissime adnato, circumdata.

" Diam. maj. 13·3, diam. min. 11·2, alt. totius testæ 6, altitudo apert. cum peristomate 5·5, ejusdem latitudo 6·8 mm." (*Stoliczka.*)

Hab. India: Belgaum, Bombay Presid. (*Stoliczka*).

Allied to *P. crassicostata*, but with more elevated spire and angulated around the umbilicus.

130. **Planispira nilagerica**, *Pfeiffer.*

Helix nilagerica, Pfeiffer, P. Z. S. 1845, p. 130; ibid., in Philippi, Abb. Beschr. ii. 1846, *Helix*, p. 87, pl. 7, fig. 11; Reeve, Conch.

Icon. vii, 1852, pl. 84, fig. 450; Pfeiffer, Conch.-Cab., *Helix*, ii, 1853, p. 92, pl. 82, figs. 15–17; Hanley & Theobald, Conch. Ind. 1870, pl. 55, figs. 6, 7.

Helix (Trachia) nilagirica, von Martens, Die Heliceen, ed. 2, 1860, p. 160.

Helix (Planispira) nilagirica, Nevill, Hand List, i, 1878, p. 77.

Helix (Plectotropis (Trachia)) nilagherica, Tryon, Man. Conch. ser. 2, iv, 1888, p. 65, pl. 14, figs. 70, 71.

Planispira (Trachia) nilagirica, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

Original description:—"T. late umbilicata, depressa, discoidea, striata, corneo-albida, linea rufa supra peripheriam cincta; spira planiuscula; anfr. 5 convexiusculi, lente accrescentes, ultimus antice abrupte deflexus; umbilicus latissimus, anfractum penultimum late monstrans, medio angustus, pervius; apertura parva, horizontalis, rotundato-ovalis; perist. continuum, album, sublabiatum, reflexum." (*Pfeiffer.*)

Diam. maj. 10·75–14·5, min. 8·75–12, alt. 3·5–5·5 mill.

Hab. India: Nilgiries (*Blanford*); Trichinopoly (*Blanford*).

A distinct and well marked species, the convolute character of the underside of the shell strongly resembling many of the North-American species of *Polygyra*, such as *P. cereolus*. The supra-peripheral band mentioned in the original diagnosis is frequently absent, and many specimens instead have the latter portion of the last whorl dark fulvous, while others again exhibit transverse, alternately light and dark bands, or they may be uniformly pale ochraceous. The shell is densely, minutely granulated under the deciduous cuticle, which, when fresh, bears very short, stiff, densely crowded hairs, neither of which fact is referred to in the diagnosis.

131. **Planispira nagporensis**, *Pfeiffer.*

Helix nagporensis, Pfeiffer, P. Z. S. 1860, p. 135; Malak. ibid., Blätt. vii (1860), 1861, p. 235.

Helix (Patula (Patulastra)) nagporensis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 90.

Original description:—"T. latissime umbilicata, depressa, tenuiuscula, oblique striata, opaca, carneo-albida; spira medio vix

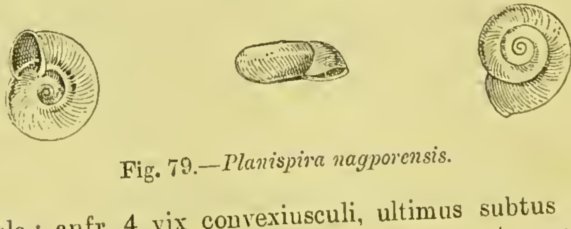


Fig. 79.—*Planispira nagporensis.*

prominula; anfr. 4 vix convexiusculi, ultimus subtus vix latior, antice deflexus et subtus subconstrictus; apertura perobliqua,

transverse ovalis; perist. tenue, marginibus convergentibus, supero recto, basali breviter reflexo.

"Diam. maj. 10, min. 8, alt. 4 mill." (*Pfeiffer.*)

Hab. India: Nagpore (*Jerdon*).

This species appears to have escaped all the recorders as, with the exception of Pfeiffer's and Clessin's 'Nomenclator,' the name does not figure in any text-book or faunal list. It is allied to *P. nilagerica*, and may indeed be only a variety of that species. The last whorl, however, is not contracted below behind the peristome, the umbilicus is narrower and does not show as many whorls, while the aperture is nearly horizontal and the margins are not continuous. In colour it is corneous white. A specimen in the Cuming collection measures 13·5 : 11 : 4 mm.

The species—hitherto unfigured—is now illustrated from the type in the British Museum.

132. **Planispira ruginosa**, *Férussac.*

Helix (Helicella) ruginosa, Férussac, Tabl. Syst., Limaçons, 1821, p. 43 (nom. nud.); ibid., Hist. Nat. Moll. 1832, pl. 71, fig. 4, Expl. Pl. p. iii (Livr. xxviii).

Helix ruginosa, Deshayes in Férussac, Hist. Nat. Moll. i, 1839, p. 38; Reeve, Conch. Icon. vii, 1852, pl. 125, fig. 748; Pfeiffer, Conch.-Cab., *Helix*, ii, 1853, p. 60, pl. 76, figs. 7–10; Hanley & Theobald, Conch. Ind. 1874, pl. 85, figs. 2, 3.

Helix (Trachia) ruginosa, von Martens, Die Helic. ed. 2, 1860, p. 160.

Helix (Planispira) ruginosa, Nevill, Hand List, i, 1878, p. 77.

Helix (Plectotropis (Trachia)) ruginosa, Tryon, Man. Conch. ser. 2, iv, 1888, p. 63, pl. 14, figs. 65–66.

Planispira (Trachia) ruginosa, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

"H. testa subdiscoidea, supra plana, ad peripheriam subangulata, subtus convexa, late umbilicata, alba, lineis fuscis bicincta; anfractibus longitudinaliter rugoso-plicatis, rugis, plurisque irregularibus; apertura ovato-rotundata, perobliqua; marginibus albis, continuis.

"Diam. 11, alt. 6 mm." (*Deshayes.*)

Hab. India: Bengal (*Leschenault*); Trichinopoly (*Blanford*); Madura (*Beddome*).

Allied to *P. asperella*, but with more elevated spire and not so smooth.

133. **Planispira sordida**, *Pfeiffer.*

Helix sordida, Pfeiffer, Symb. Hist. Helic. ii, 1842, p. 39.

Planispira (Trachia) sordida, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

Original description:—"T. perforata, globoso-depressa, striis incrementi rugosa, epidermide sordide cornea induta, obtuse carinata; spira depressa; anfr. 4½ vix convexiusculis, ultimo subtus

inflato; umbilico angustissimo, non pervio; apertura lunato-rotundata; perist. simplice, reflexiusculo.

"Diam. 11, alt. 7 mill." (*Pfeiffer.*)

Hab. India: Pondicherry.

Known only from Pfeiffer's description. I have not seen specimens.

134. **Planispira proxima**, *Férussac.*

Helix (Helicella) proxima, Férussac, Tabl. Syst., Limaçons, 1821, p. 43 (nom. nud.); ibid., Hist. Nat. Moll. 1832, pl. 71, fig. 5, Expl. Pl. p. iii (Livr. xxviii).

Helix proxima, Deshayes in Férussac, Hist. Nat. Moll. i, 1839, p. 29; Pfeiffer, Conch.-Cab., *Helix*, ii, 1853, p. 58, pl. 76, figs. 4–6; Reeve, Conch. Icon. vii, 1854, pl. 210, fig. 1487; Hanley & Theobald, Conch. Ind. 1870, pl. 28, fig. 5.

Helix (Planispira) proxima, Nevill, Hand List, i, 1878, p. 77.

Helix (Trachia) proxima, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 181.

Helix (Plectotropis (Trachia)) proxima, Tryon, Man. Conch. ser. 2, iv, 1888, p. 63, pl. 14, fig. 72.

Planispira (Trachia) proxima, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

Original description:—"H. testa orbiculato-depressa, albo-fucescente, obscure striata, late umbilicata; ultimo aufractu cylindraceo; apertura ovato-rotundata; margine albo, reflexo; peristomate continuo." (*Deshayes.*)

Two specimens—labelled: Anamullay Forest, Nilgiries—forming part of the Cuming collection in the British Museum, enable me to supplement the foregoing brief diagnosis.

Shell moderately umbilicated, depressed-conoid, finely striated, here and there showing traces of minute spirals; whitish, becoming pale fawn-coloured on the last whorl, mouth dark fuscous; unicolorous or variously ornamented with dark or pale brown bands. Whorls $5\frac{1}{2}$, convex above, flattened below, increasing rather rapidly, the last dilated towards the mouth. Spire depressed, apex obtuse, suture rather deep. Aperture elliptic-ovate, margins approaching, united by a thin callus on the parietal wall; peristome somewhat thickened; upper margin broadly expanded, scarcely reflected, with an acute edge, regularly curved; outer margin curved, expanded and slightly reflected, basal margin strongly reflected, straight, columellar margin ascending, broadly triangularly dilated and overhanging the moderate umbilicus, which shows half of the penultimate whorl, when it suddenly becomes contracted.

Major diam. 21, minor 17, alt. 12 mm.

Hab. India: Coimbatore (*Leschenault*); Pulney Hills (*Fairbank*); Trichinopoly (*Stoliczka*); Anamullay Forest, Nilgiries (*Mus. Cuming*).

Like several other species of the subgenus *Trachia*, *P. proxima* exhibits bands variable in size and number. I have not seen any

unicolorous forms, the shells of the Cuming collection in the British Museum showing a broad supra-peripheral band which ascends the spire and is visible above the suture on all the whorls, while below the periphery several narrow bands occur. The shells figured by Férussac, Pfeiffer, and in Conch. Ind. are bandless.

135. **Planispira? armstrongi**, *Smith.*

Helix (Plectotropis) armstrongi, Smith, Proc. Malac. Soc. London, i, 1895, p. 219, text-figure.

Original description:—"Testa depresse conica, in medio acute carinata, late umbilicata, solidiuscula, albida, zona purpureo-rufa latiuscula, spiram ascendente, supra ornata; spira breviter conica, ad apicem obtusa; aufractus 6–6½, lente et regulariter accrescentes leviter convexiusculi, supra suturam perspicue marginati, costulis confertis obliquis arcuatis et pulcherrime granulatis ornati, ultimus infra carinam subserratam convexiusculus, prope carinam impressus, costulis vel plicis curvatim radiantibus granulatis instructus, antice paulo descendens, circa umbilicum perspectivum rotundatus; apertura angulariter lunata, obliqua, inferne recedens, zona externa supra carina picta; peristoma superne tenue, leviter expansum, obliquum, vix arcuatum, margine inferiore valde arcuato, paulo incrassato, subreflexo, supero callo crasso recto juncto.

"Diam. maj. 28, min 25, alt. 14 mm.; apertura 7 longa, 11 lata." (*Smith.*)

Hab. Burma (*Armstrong*).

"The costulations on the upper surface become stronger as the shell increases, and the granules are also stronger upon the body-whorl than upon the rest of the spire. The acute periphery has a finely scalloped appearance when the shell is viewed from above or below." (*Smith.*)

The present species stands somewhat isolated in the Indian and Burmese fauna, rather recalling some species of *Pleurodonte* (section *Caracolus*), such as *P. bornii*, Pfr., and *P. bizonalis*, Desh., from the West Indies. In form it approaches nearest to *Planispira (Trachia) trochalia*, Benson, from the Andaman Islands, but that species has a narrower umbilicus and the margins of the peristome are not united by a raised ridge on the parietal wall, and it also lacks the strongly granulated transverse costæ of *P. armstrongi.*

It is not without hesitation it is placed in *Planispira* in the subgenus *Trachia*, but until specimens with the soft parts are taken, and their examination shall prove the contrary, this appears to be the only course to adopt. Mr. Smith referred the species to *Plectotropis*, but in this view I am unable to concur, as I do not know any species of that group possessing so solid a shell and with such coarse granulated costæ.

136. Planispira trochalia, *Benson.*

Helix trochalia, Benson, A. M. N. H. ser. 3, vii, 1861, p. 82; Hanley & Theobald, Conch. Ind. 1870, pl. 28, fig. 7; Stoliczka, Proc. A. S. B. 1870, p. 87; Pilsbry, Man. Conch. ser. 2, vii, 1891, p. 88, pl. 18, figs. 67, 68.
Ampelita (Helix) bigsbyi, Tryon, Amer. Journ. Conch. v, 1869, p. 110, pl. 10, fig. 3.
Helix (Planispira) trochalia, Nevill, Hand List, i, 1878, p. 77.
Planispira (Trachia) trochalia, Pilsbry, Man. Conch. ser. 2, ix, 1894, pp. 115, 116, pl. 34, figs. 4, 5 (jaw and radula).
Planispira trochalia, Godwin-Austen, P. Z. S. 1895, p. 442.

Original description:—"H. testa anguste umbilicata, solidiuscula, orbiculato-conoidea, subtrochiformi, irregulariter arcuato-striatula, striis nonnullis prominentioribus, castanea, apicem versus albida; spira conoidea, apice valde obtuso, sutura leviter impressa; anfractibus 5, primis convexiusculis, cæteris planiusculis, ultimo acute compresso-carinato, antice breviter descendente, subtus convexo; apertura obliqua, elliptico-lunata; peristomate tenui, undique expanso concolori, marginibus subconniventibus, columellari dilatato, umbilicum profundum semitegente." (*Benson.*)

Diam. maj. 17·5–23·5, min. 15·5–20·5, alt. 12–15 mill.

Hab. Andaman Islands: Port Blair (*Haughton*).

A peculiar form readily recognized by its trochoid spire. No reference is made in the description to the fact that the last whorl is suddenly contracted behind the peristome, nor to the presence of a hydrophanous cuticle. The shell, moreover, is covered above and below—except at the protoconch, which is smooth and shining—with excessively minute and densely crowded, wavy, spiral lines; the base has in addition a few distant spirals. In colour the species varies from pale fuscous to chestnut. Godwin-Austen mentions a variety, *conico-elata*—one of Nevill's MS. names—but gives no definition.

137. Planispira vittata, *Müller.*

Helix vittata, Müller, Verm. terr. fluv. ii, 1774, p. 76; Wood, Index Test. 1825, pl. 34, fig. 93; Orbigny, Dict. Hist. Nat. Atlas, iii, 1849, pl. 19, figs. 3, 4; Deshayes in Férussac, Hist. Nat. Moll. i, 1850, p. 233; Chenu, Illustr. Conchyl., *Helix*, 1851, pl. 10, figs. 6, 7; Reeve, Conch. Icon. vii, 1852, pl. 78, fig. 412; Pfeiffer, Conch.-Cab., *Helix*, i, 1853, p. 329, pl. 58, figs. 15, 16, 18, 19; Hanley & Theobald, Conch. Ind. 1875, pl. 130, fig. 10; Kobelt, Illustr. Conch. Buch, ii, 1879, pl. 73, fig. 21.
Helix (Helicogena) vittata, Férussac, Hist. Nat. Moll. 1822, pl. 25 A, fig. 9, pl. 26, figs. 4–6.
Helix spinolæ, Villa, Disp. Syst. Conch. 1841, p. 55.
Helix zonula, Wood, Index Test. Suppl. 1828, pl. 7, fig. 8.
Helix (Planispira) vittata, Nevill, Hand List, i, 1878, p. 76.
Helix (Eurystoma) vittata, Albers, Die Helic. 1850, p. 126; Tryon, Struct. Conch. iii, 1884, p. 40, pl. 95, fig. 58; Tryon, Man. Conch. ser. 2, iv, 1888, p. 120, pl. 33, figs. 59, 60, 62; Godwin-

Austen, Proc. Malac. Soc. London, vi, 1904, p. 48, pl. 4 (anatomy).
Planispira (*Trachia*) *vittata*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 115 (anatomy), p. 116, pl. 19, fig. 24 (shell).
Eurystoma vittata, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 286.

Shell perforate, depressed-conoid, solid, whitish or yellowish corneous, usually ornamented with various narrow and broad yellow or brown bands, from 1 to 10 in number; nepionic whorls smooth, shining, pale fuscous or blackish brown, the remaining whorls finely and irregularly striated, minutely granulated and occasionally slightly wrinkled in places. Spire convex, suture impressed, apex obtuse. Whorls $4\frac{1}{2}$–5, subplanulate or convex above, tumid below, increasing slowly and regularly, the last suddenly dilated towards the mouth and deeply descending in front. Aperture obovate, oblique, usually black or dark brown, occasionally pale fuscous; margins convergent, united by a sinuous callus on the parietal wall; peristome a little thickened, rather widely expanded and reflexed, usually of the same colour as the mouth, but sometimes edged with a paler colour, and occasionally whitish or yellowish; upper and outer margin regularly curved, basal margin nearly straight, columellar margin strongly dilated and reflexed, overhanging the umbilicus.

Major diam. 22–28, minor 17·5–21·5, alt. 15–19 mm.

Hab. India: Tranquebar, Coromandel (*Mörch*); Trichinopoly (*Blanford*); Malabar; Travancore. Ceylon (*Stoliczka, Nevill*).

A somewhat variable shell, especially as regards banding. A single specimen in the Indian Museum labelled "Java" is recorded by Nevill, but this record must be based either on a wrongly identified shell or, which is far more likely, on an accidental mixing of labels.

Var. **albina**, *Grateloup*.

Helix vittata, var. *albina*, Grateloup, Act. Soc. Linn. Bordeaux, xi, 1840, p. 401, pl. 1, fig. 19.
Helix vittata, var., Pfeiffer, Conch.-Cab., *Helix*, i, 1853, p. 330, pl. 58, fig. 17.
Helix (*Eurystoma*) *vittata*, var. *spinolæ* (non Villa), Tryon, Man. Conch. ser. 2, iv, 1888, p. 120, pl. 33, fig. 61.
Planispira (*Trachia*) *vittata*, var. *spinolæ*, Pilsbry, Man. Conch. ser. 2, ix, 1894, pl. 19, fig. 23.

Differs from the typical form in being smaller, without bands, and in the aperture being less dilated transversely.

Major diam. 22, minor 16, alt. 15 mm.

The shell figured by Tryon (copied from Conch.-Cab.), and the one by Pilsbry as *spinolæ*, do not agree with the description of *Helix spinolæ* by Villa, which differs simply from the type by its smaller size and less numerous bands.

138. **Planispira shanica**, *Beddome.*

Helix shanica, Beddome, P. Z. S. 1891, p. 314, pl. 29, figs. 10-12.
Chloritis (Trichochloritis) shanica, Pilsbry, Man. Conch. ser. 2, viii, 1893, p. 275, pl. 51, figs. 39-41; ix, 1894, p. 124.

Original description:—" Shell narrowly umbilicate, depressedly turbinate, rather solid; whorls 5, gradually increasing, rather convex, the last subangulate at the periphery, slightly descending towards the mouth, all furnished with a fine oblique striation, more prominent on the last whorl; colour a light fawn, darker at the apex of the shell and near the mouth, a narrow dark band just above the periphery; aperture oblique, rotundately lunar; peristome slightly reflexed, dark fawn-coloured, the margins distinct." (*Beddome.*)

Major diam. 14, minor 13, alt 9·5 mm.

Hab. Burma: Shan States (*Boxall*).

A close examination of the type, in the British Museum, has convinced me that this species is a *Trachia*, not a *Chloritis*. There is no sign of any hair-scars. In the original description the shell is said to be finely striated, the striæ being more prominent on the last whorl. I find, however, that the last whorl is distinctly plicate-striate, almost ribbed, approaching *P. crassicostata* in this respect.

139. **Planispira fritillata**, *Benson.*

Helix fritillata, Benson, A. M. N. H. ser. 3, xi, 1863, p. 320; Hanley & Theobald, Conch. Ind. 1874, pl, 86, figs. 8-10.
Helix (Patula (Punctum)) fritillata, Tryon, Man. Conch. ser. 2, iii, 1887, p. 33, pl. 22, figs. 17-19.

Original description:—" H. testa perspective umbilicata, depresso-subconoidea, arcuatim costulato-striata, subtus læviore polita, superne striis confertis spiralibus impressis decussata, interstitiis conspicue quadrato-granulatis, pallide cornea; spira convexa, subconoidea, apice obtuso, lævigato, sutura profunda; anfractibus 6, angustis, lente accrescentibus, convexis, ultimo demum latiusculo, extus depresso, antice vix descendente, subtus valde convexo, circa umbilicum excavato; apertura obliqua, oblique semiovato-lunata, peristomate superne tenui, valde arcuato, subtus breviter expansiusculo, arcuato, extus marginato, marginibus remotioribus.

" Diam. maj. 13, min. 12, axis 7 mill." (*Benson.*)

Hab. Burma, Pegu.

Genus **CHLORITIS**, *Beck.*

Chloritis, Beck, Index Moll. 1838, p. 29; Gray, P. Z. S. 1847, p. 172; Albers, Die Helic. 1850, p. 91; von Martens, ibid. ed. 2, 1860, p. 161; Möllendorff, P. Z. S. 1891, p. 335; Pilsbry, Man. Conch. ser. 2, vi, 1891, p. 242; viii, 1893, p. 270; ix, 1894, p. 117, pl. 28, figs. 1, 2 (anatomy; *C. porteri*).

Erigone, Albers, Die Helic. 1850, p. 92; Adams, Gen. Rec. Moll. ii, 1855, p. 202.
Semicornu (Klein), Adams, Gen. Rec. Moll. ii, 1855, p. 202.

"Shell varying from *discoidal and biconcave* to depressed subglobose with convex spire; the apical whorl flattened or sunken, and showing under a lens *regularly arranged granules or hair-points*, which often persist over the whole shell. Aperture lunate, the lip reflexed.

"Animal with undivided sole, the edges of the foot lacking a foot border; sides irregularly granulated; tail rounded, *above with an impressed longitudinal median line*; back from mantle to head having a few longitudinal grooves. Mantle edge bearing a small right body-lappet.

"Jaw strong and ribbed. Radula having the middle cusp only developed on central and inner lateral teeth, the cutting points about as long as the basal plates; side cusps completely absent, but represented by small cutting points. Lateral teeth with a long, oblique, bifid mesocone and a small ectocone.

"Genital system characterised by the lack of dart-sack or other accessory organs on the female side, the spermatheca duct rather long and closely bound to the uterus. Penis without appendix, its cavity containing at the apex an imperforate fleshy papilla, situated beside the opening of the epiphallus; epiphallus long, the penis retractor inserted upon it; terminating in a flagellum and vas deferens." (*Pilsbry.*)

140. Chloritis bifoveata, *Benson.*

Helix bifoveata, Benson, A. M. N. H. ser. 2, xviii, 1856, p. 251; Hanley & Theobald, Conch. Ind. 1870, pl. 14, fig. 8.
Helix (*Chloritis*) *bifoveata*, Pilsbry, Man. Conch. ser. 2, vi, 1891, p. 245, pl. 50, fig. between 36 and 42.
Chloritis (*Trichochloritis*) *bifoveata*, Pilsbry, op. cit. ix, 1894, p. 124.

Original description :—"T. umbilicata, subglobosa, utrinque concava, oblique striata et minutissime granulata, luteo-fusca, translucens; spira profunde excavata, perspective umbiliciformis; anfr. 4½ angusti, convexi, recedentes, ultimus prominens, inflatus, superne compressus, cæteros occultans, subtus circa umbilicum mediocrem perspectivum compresse angulatus; apertura verticalis, longissima, utrinque testam superans, angustissime lunata, superne et inferne subangulata; perist. simplex, acutum, expansiusculum, marginibus remotis convergentibus, columellari brevi, subverticali, leviter expanso.

"Diam. maj. 10, min. 9, alt. 6 mill.; long. apert. 7, lat. vix 2 mill." (*Benson.*)

Hab. Burma: Therabuin, Tenasserim Valley (*Theobald*).

A peculiar form, readily recognized by the sunken spire, in which feature it approximates such species as *C. ungulina*, from Ceram, and *C. unguiculina*, from Buru, while the umbilicus much resembles that of *C. biconcava* from China.

Section Trichochloritis, *Pilsbry*.

Trichochloritis, Pilsbry, Man. Conch. ser. 2, vi, 1891, p. 267; ix, 1894, p. 123; Wiegmann in Weber, Zool. Forsch. Reise Niederl. Ost-Indien, iii, 1893, p. 189, pl. 13, fig. 10 (anatomy; *C. crassula*).

"Shell depressed, rather thin, the spire low-convex or flat, the base generally obtusely angled around the umbilicus. Epidermis not deciduous; apex and the whole shell hirsute or marked by hair-scars arranged in regular lines; lip thin, expanded or narrowly reflexed."

Type, *Helix breviseta*, Pfr.

Range: Southern China to Borneo.

Prof. Pilsbry states (*l. c.*) that the anatomy is unknown, although in the next paragraph he refers to the genital system of *C. crassula* having been figured by Wiegmann, and he proceeds to compare this with that of *C. porteri* which, he says, it resembles "except that the enlargement at the apex of the penis is long and curved—so long that Wiegmann calls it a penis gland, although in my opinion it is not glandular, but simply a pouch-like enlargement of the penis for the accommodation of a large imperforate papilla."

He continues: "The epiphallus bears the retractor, and is continued beyond the insertion of the vas deferens in a short flagellum. The duct of the spermatheca is much and abruptly swollen at the base and the swelling is doubtfully interpreted as a dart-sack and mucus gland by Wiegmann, who did not open it, however. If his view is correct, the species must be an *Eulotella*; but I prefer to consider the structure as a mere muscular enlargement of the spermatheca-duct, probably with plicate internal walls, such as is often found in the *Helices*. The union of dart-sack with spermatheca-duct would be an extremely unusual character, if confirmed."

Pilsbry, while admitting that the sections of *Chloritis* appear to intergrade by rather easy stages throughout, retains the name *Trichochloritis* for the group of small, thin species having the same distribution as *Camæna*, and of the Indian species he includes in it *hemiopta*, *propinqua*, *shanica*, *colletti* *, and *bifoveata*, while *delibrata*, *gabata*, and *helferi*, which Möllendorff on conchological grounds included in *Chloritis*, he refers to *Trachia*. The generative organs of *delibrata*, as figured by Pilsbry, show scarcely any difference from those of *Chloritis*, except that in the latter the cavity of the penis contains an imperforate fleshy papilla at the apex. Under these circumstances I prefer to follow Möllendorff in his classification.

* *shanica* and *colletti*, the types of which I have examined, certainly have no immediate affinity with *Chloritis*, being undoubtedly *Trachias*.

141. **Chloritis propinqua**, *Pfeiffer*.

Helix propinqua, Pfeiffer, P.Z.S. 1857, p. 109; ibid. Novit. Conch. ser. 1, iii, 1869, p. 498, pl. 107, figs. 15–17; Hanley & Theobald, Conch. Ind. 1870, pl. 30, fig. 10.
Helix unicincta (Bens. MS.), Theobald, J. A. S. B. xxxiii, 1864, p. 242 (nom. nud.); Blanford, op. cit. xxxiv, 1865, p. 104.
Helix (*Plectotropis* (*Trachia*)) *propinqua*, Tryon, Man. Conch. ser. 2, iv, 1888, p. 63, pl. 14, figs. 55–57.
Chloritis (*Trichochloritis*) *propinqua*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 124.
Helix (*Planispira*) *propinqua*, Nevill, Hand List, i, 1878, p. 79; Godwin-Austen, J. A. S. B. lxiv, 1895, p. 156, pl. 7, fig. 4.
Helix (*Trichochloritis*) *propinqua*, Peile, Journ. Bombay Nat. Hist. Soc. xi, 1897, p. 134; Blanford, op. cit. xii, 1899, p. 326.

Original description:—"T. umbilicata, globoso-depressa, tenuis, striatula, albida aut pallide fuscula, fascia 1 angusta castanea supra medium ornata; spira brevissime conoidea; anfr. 4–5 convexinsculi, ultimus rotundatus, antice deflexus; umbilicus angustus, pervius; apertura diagonalis, lunato-subcircularis; perist. album, sublabiatum, marginibus convergentibus, undique late expansis." (*Pfeiffer*.)

Diam. maj. 14–19, min. 11·5–15½, alt. 7½–9⅔ mm.

Shell moderately umbilicated, depressed-conoid, shining under a deciduous cuticle, white, with a reddish-brown, supra-peripheral band. Whorls 4½, increasing slowly, finely striated, flattened above, convex below, subangulated around the umbilicus; the last widening rather suddenly towards the mouth, slightly constricted above behind the peristome, shortly descending in front; protoconch microscopically granulated, the later whorls densely crowded with minute hair-scars arranged in quincunx and usually disappearing in weathered specimens on the last whorl, which is slightly and sparsely spirally wrinkled in places below. Aperture oblique, obovate, margins approaching, united by a thin callus on the parietal wall; peristome white, thickened and reflexed; upper, outer, and basal margins regularly curved, columellar margin ascending, triangularly dilated and slightly overhanging the deep umbilicus, which at first is moderately wide, showing half of the penultimate whorl, when it becomes suddenly contracted.

The above description is drawn up from a specimen, from Poona, in my collection.

Major diam. 19, minor 15, alt. 11 mm.

Hab. India: Bombay, Satara (*Peile*); Broach, Khandala, Poona, Mahableshwar (*Blanford*); Belgoan (*Foote*); Ganjam (*Beddome*); Pulney Hill (*Theobald*).

The Theobald collection in the British Museum contains four specimens from Pulney Hill and labelled *H. fallaciosa*, which without hesitation I refer to *C. propinqua*. These measure: major diam. 14·5–16·5, minor 11·75–13·5, alt. 8·5–9·5 mm. They exhibit the hair-scars over the whole surface of the shell, but another specimen from Poona, in the same collection, shows the

hair-scars only in places, the last whorl being totally devoid of them. This appears to be the case when the shell is considerably worn and has completely lost the periostracum. I have seen unbanded specimens in Major Peile's collection.

142. **Chloritis helferi**, *Benson.*

Helix helferi, Benson, A. M. N. H. ser. 3, vi, 1860, p. 191; Hanley & Theobald, Conch. Ind. 1870, pl. 29, figs. 8, 9.

Helix (*Trachia*) *helferi*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 181.

Helix (*Plectotropis* (*Trachia*)) *helferi*, Tryon, Man. Conch. ser. 2, iv, 1888, p. 63, pl. 14, figs. 59, 60.

Planispira (*Trachia*) *helferi*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

Planispira helferi, Godwin-Austen, P. Z. S. 1895, pp. 442, 449.

Original description:—"Testa profunde et anguste perspective umbilicata, orbiculata, subdepressa, oblique striatula, foveolis conspersa, sub epidermide rufescente, sparsim hispida, albida, fascia rufa angusta superne ornata; spira depresse conoidea, apice valde obtuso, sutura impressa, submarginata; anfractibus 4½ convexiusculis, angustis, lente accrescentibus, ultimo antice descendente, supra peripheriam obsolete angulato, circa umbilicum subito excavatum compressiusculo; apertura obliqua, transverse ovato-lunata, peristomate undique expanso, marginibus approximatis, callo tenui junctis.

"Diam. major 12, minor 10, axis 6 mill." (*Benson.*)

Hab. Andaman Islands.

This species was stated by Benson to be nearly related to *asperella* and *fallaciosa*, but in build and texture it certainly approximates much more to *C. gabata*. Two specimens in my collection, one of which is efasciate, have the periostracum in a well preserved condition, and show the rather sparsely distributed hairs detected by Benson, "on the portion of the caducous epidermis remaining in the single specimen received for examination." Lt.-Col. Godwin-Austen records (*l. c.*) the finding in de Roepstorff's collection from the Nicobars of a young shell of this species, but he considers this habitat requires confirmation, as it might have got among them accidentally.

143. **Chloritis leithi**, *Gude.*

Chloritis (*Trichochloritis*) *leithi*, Gude, Proc. Malac. Soc. London, xi, 1914, p. 53, text-figure.

Original description:—"Shell rather widely umbilicated, depressed-conoid, thin, transparent, corneous, with a narrow chestnut supra-peripheral band, finely plicate-striate, somewhat sparsely covered with soft hairs placed in pits and arranged in quincunx. Spire low, apex sunken, suture deep. Whorls 4, convex above, tumid below, increasing rapidly, the last exceeding in width the total of the other three, dilated at the mouth, not constricted

behind the peristome, shortly but deeply descending in front, subangulated around the umbilicus, which is rather wide at first, showing the greater part of the penultimate whorl, when it suddenly contracts, leaving only a very narrow perforation. Aperture subcircular, margins approaching; peristome scarcely thickened, expanded but not reflexed; the columellar margin triangularly dilated and slightly overhanging the umbilicus.

Major diam. 14·5, minor 11·5, alt. 7 mm." (*Gude.*)

Hab. India: Bombay (*Leith*).

From *C. helferi*, an Andaman species, *C. leithi* differs in being much thinner in texture, in having the hairs, which are larger and softer, much more crowded, and in being coiled differently

Fig. 80.—*Chloritis leithi.* (From Proc. Malac. Soc. London.)

as it has the last whorl proportionately wider. It also bears some superficial resemblance to *Chloritis propinqua*, but that species is a much stouter shell, with a more elevated spire, while in *C. leithi* the umbilicus, although wider at first, becomes more contracted. There are two other shells in the British Museum also collected by Dr. Leith, but they are slightly damaged. A specimen in Mr. Ponsonby's collection is a trifle smaller than the type, measuring 14 : 10·75 : 6·75 mm.

None of the specimens is quite adult, the peristome apparently not having been quite completed.

144. Chloritis wimberleyi, *Godwin-Austen.*

Planispira wimberleyi, Godwin-Austen, P. Z. S. 1895, p. 449.

Original description :—"Shell depressedly orbiculate, narrowly umbilicated, very finely hirsute; sculpture, when this is abraded the surface is covered with minute regular papillation, which is much coarser than that of *H. helferi*; colour horny-grey; spire rounded; apex rounded; suture impressed; whorls 4, not fully developed, slightly convex; aperture and peristome probably slightly expanded and reflected.

"Maj. diam. 10·2, min. 8·9; alt. axis 5·7 mm.

"*Hab.* Nicobars.

"The species is nearest to *H. helferi*, but may be distinguished by its narrower umbilicus and the great difference in sculpture, and the whorls above are not so flat. This is probably No. 102 of Nevill's Hand List (p. 76), collected by Ferd. Stoliczka." (*Godwin-Austen.*)

145. Chloritis delibrata, *Benson.*

Helix delibratus, Benson, J. A. S. B. v, 1836, p. 352.
Helix delibrata, Benson, A. M. N. H. ser. 2, ii, 1848, p. 162; Blanford, J. A. S. B. xxxiv, 1865, p. 89; Hanley & Theobald, Conch. Ind. 1870, pl. 14, fig. 10; Nevill in Anderson, Zool. Results Exp. W. Yunnan, i, 1878, p. 873.
Trachia delibrata, Stoliczka, J. A. S. B. xl, 1871, p. 225, pl. 16, figs. 1–3 (anatomy).
Helix (Planispira) delibrata, Nevill, Hand List, 1878, p. 76.
Helix (Trachia) delibrata, Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 325.
Helix (Plectotropis (Trachia)) delibrata, Tryon, Man. Conch. ser. 2, iv, 1888, p. 64, pl. 14, fig. 75.
Planispira (Trachia) delibrata, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116, pl. 32, figs. 44, 45 (anatomy).
Chloritis (Trichochloritis) delibrata, Gude, Proc. Malac. Soc. London, vii, 1906, p. 115.

Shell discoid, rather widely umbilicated, thin, semi-transparent, pale fuscous or ochraceous, finely striated, shining under a velvety cuticle, covered in the fresh condition with close-set stiff bristles arranged in quincunx. Spire plane, apex depressed or immersed, suture deep. Whorls $3\frac{1}{4}$–4, convex, subangulated around the umbilicus, increasing rather suddenly, the last twice as wide as the penultimate, slightly dilated towards the mouth, slightly gibbous below behind the peristome, shortly and abruptly descending in front. Aperture oblique, obovate-auriculate, margins approaching; peristome white or pale fulvous, scarcely thickened, reflexed; upper margin ascending at first, curved; outer and basal regularly curved, columellar obliquely ascending, triangularly dilated and overhanging the umbilicus, which shows half of the penultimate whorl, when it suddenly contracts.

Major diam. 17–22, minor 14–17, alt. 8–10·5 mm.

Hab. India: Sylhet; Assam (*Stoliczka*, *Peal*); Darjeeling (*Stoliczka*, *Mainwaring*); Khasi Hills and Dafla Hills (*Godwin-Austen*). Burma: Bhamo (*Anderson*); Thagata Juva, Mouleyit Mt. (*Fea*).

Apparently a common shell, having been collected by several naturalists. The original diagnosis by Benson is very short and might apply to several allied forms—a very unusual occurrence with Benson's species. The above description is drawn up from a number of specimens collected for the writer by a native in the Khasi Hills.

The following varieties are admitted:—

Var. **procumbens**, *Gould.*

Helix procumbens, Gould, Boston Journ. Nat. Hist. iv, 1844, p. 453, pl. 24, fig. 1; Philippi, Abb. Beschr. Conchyl. iii, 1847, *Helix*, p. 3, pl. 10, fig. 5; Reeve, Conch. Icon. vii, 1852, pl. 82, fig. 435.
Helix delibrata, Pfeiffer, Conch.-Cab., *Helix*, iv, 1854, p. 352, pl. 135, figs. 8, 9.
Helix delibrata, var. *procumbens*, Nevill, Hand List, i, 1878, p. 76.

Differs from the type in having the last whorl more dilated

towards the mouth and more deeply descending in front; the spire is more raised and the umbilicus narrower.

Hab. Burma: Tavoy and Moulmain (*Stoliczka*); Bassein and Arakan Hills (*Blanford, Kurz*).

Var. **fasciata**, *Godwin-Austen.*

> *Helix delibrata*, var. *fasciata*, Godwin-Austen, J. A. S. B. xliv, 1875, p. 1, pl. 1, fig. 1.
> *Helix* (*Plectotropis* (*Trachia*)) *delibrata*, var. *fasciata*, Tryon, Man. Conch. ser. 2, iv, 1888, p. 64, pl. 14, fig. 76.

Variously ornamented with brown bands. The commonest form appears to be one with a single supra-peripheral band.

Hab. India: W. Khasi Hills (*Godwin-Austen*); Sibsagar (*Peal*).

Var. **khasiensis**, *Nevill.*

> *Helix delibrata*, Hanley & Theobald, Conch. Ind. 1870, pl. 14, fig. 9.
> *Helix* (*Trachia*) *delibrata*, var. *khasiensis*, Nevill, J. A. S. B. xlvi, 1877, p. 21.

Characterized by the raised and rounded whorls, less open umbilicus and contracted aperture.

Hab. India: Khasi Hills, Naga Hills.

146. **Chloritis gabata**, *Gould.*

> *Helix* (*Caracolla*) *gabata*, Gould, Boston Journ. Nat. Hist. iv, 1844, p. 454, pl. 24, fig. 9.
> *Helix gabata*, Reeve, Conch. Icon. vii, 1852, pl. 127, fig. 766; Hanley & Theobald, Conch. Ind. 1870, pl. 14, fig. 4; Pfeiffer, Conch.-Cab., *Helix*, iii, 1881, p. 482, pl. 159, figs. 15-17.
> *Plectotropis gabata*, Wallace, P. Z. S. 1865, p. 408.
> *Trachia gabata*, Stoliczka, J. A. S. B. xl, 1871, p. 228.
> *Helix* (*Planispira*) *gabata*, Nevill, Hand List, i, 1878, p. 70.
> *Helix* (*Philidora*) *gabata*, von Martens, Journ. Linn. Soc. London, xxi, 1887, p. 162.
> *Helix* (*Plectotropis*) *gabata*, Tryon, Man. Conch. ser. 2, iv, 1888, p. 57, pl. 14, fig. 82.
> *Helix* (*Trachia*) *gabata*, Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 325.
> *Planispira* (*Trachia*) *gabata*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.
> *Chloritis* (*Trichochloritis*) *gabata*, Gude, Proc. Malac. Soc. London, vii, 1906, p. 115.

Original description:—"Testa albido-cornea, supra planulata, infra valde convexa, late et profunde umbilicata; anfr. $4\frac{1}{2}$, leviter striatis, ultimo carina castanea circumdato; apertura subquadrata, labro albo reflexo.

"Shell pale horn-color, shining, showing about four and a half whorls above, which compose a nearly discoidal spire; suture distinct; the last whorl somewhat channelled near the periphery, which consists of a prominent, obtuse, compressed, chestnut-coloured carina, fully developed to the lip; beneath, greatly

convex, descending suddenly into a broad, deep, tunnel-shaped umbilicus, passing nearly through the shell; surface faintly marked by the striæ of growth; aperture rendered somewhat quadrangular by the junction of the lips, and the two angles at the keel, and the ridge at the umbilicus; lip white, reflected, commencing below the keel, then rising to a level with it.

Diam. $\frac{4}{5}$ inch [=20·25 mm.]; height less than $\frac{2}{5}$ inch [=10 mm.]." (*Gould.*)

Hab. Burma: Tavoy (*Gould*); Moulmain (*Stoliczka*, *Fea*), var. India: Khasi Hills (*Stoliczka*); Cachar (*Godwin-Austen*).

A well-marked species, characterized by the flattened spire and carinated whorls.

Wallace mentions the species from Menado, Celebes (P. Z. S. 1865, p. 408) but this record was based on a mistaken identification. The Celebes form has since been made the type of another species—*pilisparsa*—by von Martens (Sitz.-Ber. Ges. Naturf. Fr. Berlin, 1885, p. 192).

Var. **merguiensis**, *Philippi.*

Helix merguiensis, Philippi, Zeits. Malak. iii, 1846, p. 192; Reeve, Conch. Icon. vii, 1854, pl. 177, fig. 1205; Hanley & Theobald, Conch. Ind. 1870, pl. 14, fig. 7.
Helix (Plectotropis) gabata (=*merguiensis*), Tryon, Man. Conch. ser. 2, iv, 1888, p. 57, pl. 14, fig. 83.
Planispira (Trachia) gabata, var. *merguiensis*, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 116.

Hab. Burma: Mergui (*Philippi*); Mergui Archipelago, King Island (*Anderson*).

Differs from typical *gabata* in having the spire raised, the supra-peripheral keel less acute and more compressed, the umbilicus narrower, and the margins of the peristome more reflexed.

147. **Chloritis hemiopta**, *Benson.*

Helix hemiopta, Benson, A. M. N. H. ser. 3, xi, 1863, p. 318; Hanley & Theobald, Conch. Ind. 1870, pl. 30, fig. 4, pl. 53, fig. 8; Pfeiffer, Novit. Conch. v, 1877, p. 37, pl. 143, figs. 1–8; Dohrn, Conch.-Cab., *Helix*, iv, 1894, p. 578, pl. 170, figs. 5–7.
Helix (Planispira) hemiopta, Nevill, Hand List, i, 1878, p. 78.
Helix (Obba (Neocepolis)) hemiopta, Pilsbry, Man. Conch. ser. 2, vi, 1891, p. 238, pl. 31, figs. 21, 25, pl. 64, figs. 67–72.
Chloritis (Trichochloritis) hemiopta, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 124.
Planispira hemiopta, Godwin-Austen, P. Z. S. 1895, p. 442.

Original description:—"H. testa anguste umbilicata, depresso-conoidea, vix striatula, læviuscula, minutissime granulata, opaca, albida; anfractu ultimo superne castanea, versus peripheriam suturiatore; spira convexo-conoidea, apice obtuso, sutura vix impressa; anfractibus $4\frac{1}{2}$, convexiusculis, sensim acrescentibus, ultimo superne prope peripheriam obtuse angulatam concavi-

usculo, subtus convexiusculo ; apertura obliqua, subquadrato-lunata, intus concolore, peristomate expansiusculo, superne antice arcuato, subtus breviter reflexo, marginibus remotis, columellari superne valde dilatato, umbilicum subtegente.

"Diam. maj. 16, min. $13\frac{1}{2}$, axis 10 mm." (*Benson.*)

Hab. Andaman Islands : Port Blair (*Stoliczka, Nevill, Wood-Mason, Roepstorff*).

A rather striking species of *Trichochloritis*, exhibiting a considerable amount of variation as regards ornamentation and coloration. Pfeiffer figures several distinct forms. Lt.-Col. Godwin-Austen mentions two varieties (*unifasciata* and *albina*, both MS. names of Nevill). The commonest form appears to be the one with a dark chestnut or blackish-brown peripheral band. The colour of the shell is usually white, but some forms have the penultimate and last whorls reddish brown or dark fuscous above the periphery, with or without the peripheral baud, or the two whorls may be entirely fuscous. White shells without band also occur. The last whorl, moreover, is characterized by a girdle-like swelling at the periphery bounded above by a corresponding depression, while the upper part of the whorl again is inflated. The peristome is usually white, but when the last whorl is eutirely dark brown it is reddish violet.

148. **Chloritis cyclotrema**, *Benson.*

Helix cyclotrema, Benson, A. M. N. H. ser. 3, xi, 1863, p. 88; Hanley & Theobald, Conch. Ind. 1870, pl. 28, fig. 10.

Ariophanta cyclotrema, Theobald, Cat. Shells Brit. India, 1876, p. 22.

Nanina (*Ariophanta*) *cyclotrema*, Tryon, Man. Conch. ser. 2, ii, 1886, p. 17, pl. 2, fig. 22.

Helix (*Planispira* or *Trachia*) *cyclotrema*, Blanford, Proc. Malac. Soc. London, iii, 1899, p. 283.

Original description :—"H. testa sinistrorsa, obtecte umbilicata, conoideo-snbglobosa, oblique striatula, grauulata, sub epidermide cornea, albida ; spira conoidea, apice obtuso, subfoveata, suturis impressis ; anfractibus $4\frac{1}{2}$, convexis, gradatim cresceutibus, ultimo ad peripheriam obtuse angulato, unifasciato, antice lato, longe descendente, subtus convexo ; apertnra valde obliqua, rotundata, peristomate dilatato, reflexiusculo, marginibus conniveutibus, approximatis, callo brevi junctis, columellari late auriculato umbilicum celante.

"Diam. maj. 22, min. 18, axis 11 mm." (*Benson.*)

Hab. India : Sumeysur, base of Himalayas (*Theobald*).

149. **Chloritis anserina**, *Theobald.*

Helix anserina, Theobald, J. A. S. B. xxxiv, 1866, p. 276 (nom. nud.) ; ibid. xxxix, 1870, p. 395 (nom. nud.).

Helix anserina, Hanley & Theobald, Conch. Ind. 1875, pl. 112, figs. 7 & 10.

Shell narrowly umbilicated, depressed-globose, pale corneous, finely striated transversely, densely covered with hair-scars arranged in quincunx; spire depressed, apex obtuse, suture linear. Whorls 5, convex, increasing rather rapidly, the last much dilated towards the mouth and slightly constricted behind the peristome, the base inflated towards the mouth, not angulated at the periphery or around the umbilicus. Aperture broadly auriculate; margins slightly approaching, united by a thin flexuous callus on the parietal wall; peristome white, thickened, and reflexed, upper margin nearly straight, outer and basal curved, columellar vertical, broadly triangularly dilated and reflexed over the narrow umbilicus.

Major diam. 30, minor 25, alt. 18·5 mm.; apert. width 13, height 14 mm.

Hab. Burma: Shan States (*Fedden*).

The species, although well illustrated in Conch. Ind., has never been described. The above description is drawn up from the shell—probably the type—in the Theobald collection in the British Museum. I have adopted the later spelling of the specific name, the earlier one in the J. A. S. B., in both cases, being evidently due to a printer's error.

This and the next species bear a striking resemblance to *C. franciscanorum*, Gredler, a Chinese form.

150. **Chloritis theobaldi**, *Gude.*

Chloritis (*Trichochloritis*) *theobaldi*, Gude, Proc. Malac. Soc. London, xi, 1914, p. 54, text-figure.

Original description:—"Shell moderately umbilicated, depressed-conoid, pale corneous, with a very faint supra-peripheral band, finely striated transversely, and densely covered with hair-scars arranged in quincunx. Spire conoid, apex prominent, suture rather deep. Whorls $5\frac{1}{2}$, convex, increasing slowly and regularly, the last widening towards the mouth, not constricted behind the peristome, slightly angulated at the periphery at first, the angulation disappearing near the mouth; angulated around the deep umbilicus, which shows nearly the whole of the penultimate whorl. Aperture subcircular, margins distant, united by a thin sinuous callus on the parietal wall; peristome white, thickened and shortly reflexed; margins regularly curved, columellar ascending, triangularly dilated, and slightly overhanging the umbilicus.

"Major diam. 24·5, minor 21, alt. 16 mm.; apert. width 10, height 9·5 mm." (*Gude.*)

Hab. Burma: Shan States (type); Bhamo.

The shell on which this species is based occurred with the specimen of *C. anserina* in the Theobald collection. It differs from the latter in having a more conical spire and a wider umbilicus, the base is less inflated, and in consequence the aperture is more dilated laterally. It is also differently coiled, for, although it measures one-fifth less in its diameter, it possesses

half a whorl more; the hair-scars, moreover, are much finer and more crowded, while the presence of a supra-peripheral band, although only a faint one, still further differentiates it from *C. anserina.*

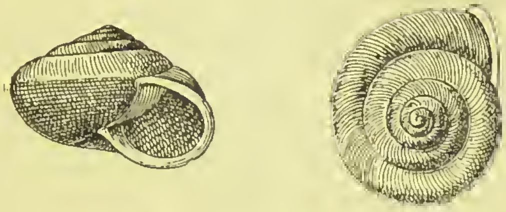


Fig. 81.—*Chloritis theobaldi.* (From Proc. Malac. Soc. London.)

A specimen in the Hungerford collection of the British Museum I also refer to *C. theobaldi.* It is a trifle smaller than the type, measuring 24 : 20 : 15 mm., and exhibits a very faint trace only of the supra-peripheral band near the peristome.

The two species approach *C. franciscanorum*, Gredler, a Chinese form. *C. theobaldi* especially bears a striking resemblance, but has the umbilicus a little more contracted, the spire is relatively higher, and the aperture is less dilated laterally, while the columellar margin ascends less obliquely; the hair-scars are also finer.

Genus **AMPHIDROMUS**, *Albers.*

Amphidromus, Albers, Die Heliceen, 1850, p. 138 (in part); Pfeiffer, Malak. Blätt. ii, 1856, p. 146 (in part); von Martens, Die Heliceen, ed. 2, 1860, p. 184; ibid., Preuss. Exp. Ost-Asien, Zool. Theil, ii, 1867, pp. 77 & 332; Semper, Reisen, Arch. Philipp. 2te Theil, vol. iii, 1877, p. 146; Fulton, A. M. N. H. ser. 6, xvii, 1896, p. 66; Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 127.

TYPE, *Helix perversa*, Linn.

Range. India (Sylhet), Burma, Farther India, Malay Archipelago, and Philippine Islands.

"Shell of moderate size, dextral or sinistral, long-ovate, with 6–8 moderately convex whorls; smooth (rarely ribbed) and light or bright-colored, yellow predominating, often with green or brown streaks, flames, or bands. Apical whorls smooth or obsoletely pitted. Aperture somewhat oblique, ovate, not contracted by teeth or folds; peristome more or less thickened, expanded, or reflexed, the columellar margin reflexed, with a very weak fold or none.

"Jaw thin and weak, with flat ribs crenulating the edges. Radula with broad V-shaped rows, the teeth of 'arboreal' type, with the side cusps brought near the median cusp, all the cusps broad; outwardly the side cusps are split. Kidney extremely long and narrow, with reflexed ureter and closed secondary ureter. Genitalia of typically epiphallogonous structure; receptaculum

seminis on a long, simple duct; penis short, with the retractor muscle inserted low, and ending in a flagellum and the vas deferens. Nervous and retractor systems Helicine." (*Pilsbry*.)

The genus *Amphidromus* as originally proposed by Albers included several species since then referred to *Helicostyla*. Von Martens was the first correctly to define the group, which owes its name "to the peculiar circumstance that several species occur either dextral or sinistral, with equal frequency; others are sinistral only, still others dextral." Many of the species were originally described as *Bulimi*, while the group remained to be considered as a section of the genus *Bulimus*, until Pilsbry in 1900 proved that the genus did not belong to "the *Bulimulidæ*, but to that group of *Helicidæ* called *Epiphallogona*, of which the genera *Chloritis*, *Obba*, *Planispira*, and *Papuina* are leading members."

The Indian region contains but a limited number of species, which is not surprising when we bear in mind the fact that it is on the confines of the area of distribution of the genus.

Bulimus andamanensis (coll. Mousson) has been referred to by von Martens in Preuss. Exp. Ost-Asien, 1867, p. 339, as from the Andaman Islands; it was described and figured by Pfeiffer in Novit. Conch. ser. 1, iv, 1871, p. 35, pl. 116, figs. 7–10, and referred to *Amphidromus inversus* as a small form by Pilsbry (Man. Conch. ser. 2, xiii, 1900, p. 169, pl. 56, figs. 94–97). Pfeiffer himself stated that it approached *B. inversus*, and might perhaps be regarded as a dwarf variety. Fulton states (A. M. N. H. ser. 6, xvii, 1896, p. 70) that the small form of *A. inversus* has been found at Sarawak and Sirhassen Island by Everett, and as no *Amphidromus* has been found in the Andaman Islands by recent collectors, it must be assumed that the record is based on an error, probably due to a mixing of labels.

151. Amphidromus janus, *Pfeiffer*.

Bulimus janus, Pfeiffer, P. Z. S. 1852, p. 85; ibid., Conch.-Cab., *Bulimus*, 1854, p. 156, pl. 48, figs. 1–4; Gassies, Act. Soc. Linn. Bordeaux, xxiv, 1861, p. 253, pl. 5, fig. 5.

Bulimus (*Amphidromus*) *janus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 147; Hanley & Theobald, Conch. Ind. 1876, p. xi, and foot-note 1, pl. 19, fig. 5 (*atricallosus* in explan. plates, p. 10).

Cochlostyla (*Canistrum*) *janus*, Adams, Gen. Rec. Moll. ii, 1855 p. 143.

Amphidromus janus, Nevill, Hand List, i, 1878, p. 126; Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 156, pl. 58, figs. 14–18.

Original description:—"B. testa imperforata, dextrorsa vel sinistrorsa, subfusiformi-oblonga, solida, vix nitidula, lutea fasciis 3 extus opace viridibus, intus nitide atro-castaneis, peristoma non attingentibus, basali latissima, varicibusque castaneis sparsis ornata; spira conica, acutiuscula; anfractibus 6–7 convexiusculis, ultimo ⅔ longitudinis subæquante, basi attenuato; columella verticalis, stricta; apertura obliqua, semiovalis, basi subangulata; peristo-

mate subincrassato, breviter reflexo, albo, marginibus callo nigro-castaneo junctis.

"Long. 47, diam. 20 mill." (*Pfeiffer.*)

Hab. Burma: Tavoy, Mergui (*Theobald*).

Pfeiffer, when describing the species, gave the habitat "New Hebrides" from information supplied by Cuming, whose "habitats" have on so many occasions proved erroneous or unreliable. Gassies attributed the species to New Caledonia, also on the strength of a specimen, so-labelled, received by him from Cuming! Both these localities may be ignored and Burma taken to be the true habitat, the species having been collected at Mergui by Theobald, as recorded by Nevill in his 'Hand List of Mollusca in the Indian Museum.' The shell, moreover, figured in Conch. Ind. as *atricallosus*, from Tavoy, has been referred—correctly I think—to the present species by Pilsbry, who considers that it "stands quite alone for an *Amphidromus*, having no close companions."

152. **Amphidromus atricallosus**, *Gould.*

Bulimus atricallosus, Gould, Proc. Boston Soc. Nat. Hist. i, 1844, p. 140; ibid., Boston Journ. Nat. Hist. iv, 1844, p. 457, pl. 24, fig. 3; Deshayes in Férussac, Hist. Nat. Moll. ii, part 2, 1851, p. 51, pl. 130, figs. 9, 10.

Bulimus perversus, var. δ, Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 308; ibid., Conch.-Cab., *Bulimus*, 1854, p. vi, pl. 40, figs. 10, 11.

Bulimus (Amphidromus) atricallosus, von Martens, Preuss. Exp. Ost-Asien, Zool. Theil, ii, 1867, p. 77; ibid., Conch. Mitth. ii, 1883, pp. 130, 131; ibid., Journ. Linn. Soc. London, xxi, 1887, p. 163.

Amphidromus atricallosus, Semper, Reisen Arch. Philipp. 2te Theil, iii, 1877, p. 147, pl. 16, f. 20 (teeth); Nevill, Hand List, i, 1878, p. 126; Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 165, pl. 58, figs. 19–21.

Amphidromus perversus, var. *atricallosa*, Fulton, A. M. N. H. ser. 6, xvii, 1896, p. 69.

Bulimus eques, Pfeiffer, Malak. Blätt. iv, 1857, p. 158.

Original description:—"Testa solida, imperforata, oblongo-ovata, vix striata, sulphurea; anfr. 7 convexiusculis, ad suturam constrictis; apertura lunato-ovali, basi sub-effusa, labro albo, reflexo, marginibus callo atro junctis.

"Long. $2\frac{1}{3}$, lat. 1 poll."

"Shell imperforate, elongated ovate, solid, smooth, and shining, of a sulphur-yellow colour; whorls seven, moderately convex, somewhat girt in near the suture; last whorl nearly two-thirds the length of the shell; aperture ovate-lunate, somewhat angular at base, and slightly effuse; lips white, widely revolute, not flattened; columella white, the callus uniting the extremities of the peristome, and, as far within the shell as can be seen, pitchy-black; from the midst of it, extending across the penult. whorl, is a line of the same color, showing the termination of a former stage of growth.

"Length $2\frac{1}{3}$ [=59 mm.]; breadth 1 inch [=25 mm.]." (*Gould.*)

Hab. Burma: Tavoy (*Mason*); Mergui forest and King Island (*Anderson*). Salanga (*Weber*); Penang (*Martens*); Saigoon (*Mus. Cuming, Semper*).

Both dextral and sinistral shells occur, but the former appear to be more common than the latter.

153. Amphidromus moniliferus, *Gould.*

Bulimus moniliferus, Gould, Proc. Boston Soc. Nat. Hist. ii, 1846, p. 99; ibid., Otia Conch. 1862, p. 198.
Bulimus (*Amphidromus*) *moniliferus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 147; von Martens, Die Heliceen, ed. 2, 1860, p. 185.
Amphidromus moniliferus, Nevill, Hand List, i, 1878, p. 126; Fulton, A. M. N. H. ser. 6, xvii, 1896, p. 90, pl. 7, fig. 9; Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 179, pl. 62, figs. 73, 74.
Bulimus theobaldianus, Benson, A. M. N. H. ser. 2, xix, 1857, p. 329; Hanley & Theobald, Conch. Ind. 1870, pl. 19, fig. 10; 1876, p. xi, and footnote 8.
Amphidromus theobaldianus, Theobald, J. A. S. B. xlv, 1876, p. 187, pl. 14, fig. 8.
Amphidromus schomburgki, var. *theobaldi*, Nevill, Hand List, i, 1878, p. 126.
Buliminus (*Rhachis*) *theobaldianus*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 672, pl. 102, fig. 14.

Original description:—"Testa conico-oblongata, plerumque sinistrorsa, lævis, luteo-cinerea flammulis longitudinalibus, fascia suturali lineari, et fascia subsuturali interrupta fuscis; regione umbilicali fusca, fascia lutea divisa; aufr. 7, ultimo subcarinato; apertura subovata, basi angulata, sub-effusa; labro reflexo, rubro-purpureo, ad columellam dilatato; fauce purpurea.

"Long. $1\frac{1}{5}$ [=30·5 mm.]; lat. $\frac{7}{10}$ poll. [=17·75 mm.]." (*Gould.*)

Hab. Burma: Tavoy (*Mason*).

154. Amphidromus sylheticus, *Reeve.*

Bulimus sylheticus, Reeve, Conch. Icon. 1849, pl. 77, fig. 564; Pfeiffer, Conch.-Cab., *Bulimus*, 1853, p. 68, pl. 20, figs. 25, 26; Hanley & Theobald, Conch. Ind. 1870, pl. 19, fig. 9; Godwin-Austen, J. A. S. B. xlv, 1876, p. 316.
Bulimus (*Amphidromus*) *sylheticus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 147.
Amphidromus sinensis, var. *sylhetica* (Benson), Nevill, Hand List, i, 1878, p. 127.
Amphidromus sylheticus, Fulton, A. M. N. H. ser. 6, xvii, 1896, p. 79; Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 189, pl. 63, figs. 97, 98.

"Shell sinistral, umbilicate, ovate-conic, polished, striatulate, the first whorl weakly punctulate; *greenish-yellow* below the periphery, paler above, fading on the spire, the early whorls and apex whitish. Whorls $5\frac{1}{2}$, slightly convex, the last but weakly convex above, very convex, full, and sack-like below. Aperture ovate, oblique, slightly brown or ochre-tinted within; the *peristome white, reflexed*;

columella with slightly convex inner edge, broadly dilated, *guttered at its union with the body of the shell*; the dilated edge overhanging a rather large umbilicus, and a little thickened where it passes upon the parietal wall. Parietal callus thin and translucent." (*Pilsbry*.)

Alt. 26, diam. 15, longest axis of aperture 14 mm.

Alt. 24, diam. 14, longest axis of aperture 12·5 mm.

Hab. India: southern slopes of Khasi and Garo Hills, Assam (*Godwin-Austen*).

Attributed to Sylhet, Eastern Himalayas, by Reeve. Lt.-Col. Godwin-Austen states that its habitat is the southern slopes of the Khasi and Garo Hills, whereas Sylhet is a district in the plains of Lower Bengal, south of the Khasi Hills, and the specific name is, therefore, as Godwin-Austen points out, unfortunately misleading and inappropriate.

The distinctly greenish-yellow colour of the lower portion, the sack-like base, and the sort of gutter at the root of the columella are said to be characteristic features.

155. Amphidromus masoni, *Godwin-Austen.*

Bulimus masoni, Godwin-Austen, J. A. S. B. xlv, 1876, p. 316.
Amphidromus masoni, Fulton, A. M. N. H. ser. 6, xvii, 1896, p. 81, pl. 6, fig. 2; Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 189, pl. 62, fig. 72.
Amphidromus daflaensis (Godwin-Austen), Nevill, Hand List, i, 1878, p. 127 (nom. nud.).

Original description:—" Shell sinistral, acuminately oblong, thick, side of spire rather flat, whorls 7, smooth and shiny, under lens finely and spirally striate, colour sea-green, intenser below the keel, paling towards the apex, the columella dark purple, a narrow fillet of same colour borders the suture closely below, commencing at the upper and outer angle of the aperture. Aperture oval, angular above, lip slightly reflected. The last whorl slightly keeled." (*Godwin-Austen*.)

Alt. 1·2 [=30·5 mm.], major diam. 0·5 inch [=12·75 mm.].

Hab. India: Dihiri Parbat, Dafla Hills, Assam (*Godwin-Austen*).

" Similar in form to *A. sylheticus*, but the latter shell is smaller exhibits no trace of spiral striation, has its surface more polished, while the columellar margin and outer lip are pure white; and in dozens I have collected no trace of band is ever seen. In colour too *sylheticus* differs in being lemon-yellow with a greenish tinge on the body-whorl." (*Godwin-Austen*.)

156. Amphidromus lepidus, *Gould.*

Bulimus lepidus, Gould, Proc. Boston Soc. Nat. Hist. vi, 1856, p. 12; ibid., Otia Conch. 1862, p. 219; Hanley & Theobald, Conch. Ind. 1872, pl. 84, fig. 6.
Amphidromus lepidus, Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 190, pl. 63, fig. 99.

Original description:—"T. parva, plerumque sinistra, vix perforata, ovato-conica, elevata, polita, citrina; anfr. 6 convexis, ultimo ventricoso; sutura bene impressa; apertura subcircularis; peristomate albo, reflexo, ad columellam dilatato, extremitatibus approximatis."

"Axis $\frac{7}{8}$ [=22·5 mm.], diam. $\frac{1}{2}$ poll. [=12·5 mm.]." (*Gould.*)

Hab. Mergui Archipelago (*Benjamin*).

"A pretty shell, grouping with *lævus*, *adamsi*, and *monilifera*, but smaller, proportionally shorter and more ventricose, and differing entirely in colouring, texture, and the broadly rounded form of the aperture."

Mr. Fulton considers *lepidus* and *sylheticus* identical. He states* that the types of both are in the British Museum. A shell, labelled *lepidus*, is certainly marked "type" in the same handwriting, but the word "type" there is undoubtedly meant in the sense of "typical form," as the type on which Gould based his description is in the Albany Museum. The same label bears the name *sylheticus* in Pfeiffer's handwriting.

Prof. Pilsbry is of opinion that as *sylheticus* is a species of the hills, and *lepidus* inhabits a region rather different faunally, the latter should be allowed to stand pending further comparisons of a good series of the Mergui form with Reeve's species. *A. lepidus* has a more pyramidal shape. Hanley and Theobald while admitting that the two forms approximate observe that Gould's shell is shorter, with more rounded whorls, and lacks the notch at the commencement of the pillar-lip.

157. Amphidromus sinensis, *Benson.*

Bulimus sinensis, Benson, A. M. N. H. ser. 2, vii, 1851, p. 264; Pfeiffer, Conch.-Cab., *Bulimus*, 1853, p. 67, pl. 20, figs. 1, 2; Blanford, J. A. S. B. xxxiv, 1865, p. 94.

Bulimus (*Amphidromus*) *sinensis*, Pfeiffer, Malak. Blätt. ii, 1856, p. 147; von Martens, Die Heliceen, ed. 2, 1860, p. 185.

Amphidromus sinensis, Nevill, Hand List, i, 1878, p. 126; Fulton, A. M. N. H. ser. 6, xvii, 1896, p. 80; Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 190, pl. 62, figs. 64, 65.

Original description:—"Testa perforata sinistrorsa, ovata-conica, glabra, lutescente, subtus purpureo-castaneo bifasciata; spira conica, apice obtusiusculo; anfractibus $5\frac{1}{2}$ convexiusculis, ultimo spiram æquante, fasciis submediani basalique intra aperturam productis; columella subtorta; apertura obliqua, oblique ovata, peristomate planato-reflexo, livide purpureo, postice livide fusco, marginibus callo albido vix junctis, columellari albido breviter superne dilatato.

"Long. 30, lat. 18 mill.; long. apert. 16, lat. 12 mill." (*Benson.*)

Hab. Burma: Pegu (*Theobald, Stoliczka*), Prome, Tongoop, Akyab (*Blanford*); India: Khasi Hills (*Nevill*). S. China (*Cantor*).

* A. M. N. H. ser. 6, xvii, 1896, p. 80.

Mr. Fulton states that the type of this species cannot be found in the Benson collection, in the Cambridge Museum, and Prof. Pilsbry suggests that it may not have been returned by Pfeiffer and is now perhaps in Dohrn's collection. As Pfeiffer, however, distinctly states that the type is in the Benson collection (Mon. Helic. Viv. iii, 1853, p. 320), and as, moreover, the Benson collection has experienced many vicissitudes, so that some other types likewise are not traceable, the more likely explanation, in my opinion, is that the shell must have gone astray.

A. sinensis is said to resemble *A. sylheticus* in the globose base and groove at root of the columella, but to differ in being stouter in form, two-banded below, and with a brown streak behind the lip, which is said to be pale lilac.

I possess, however, two specimens from Laos, received in exchange from the Senckenberg Museum, Frankfurt a./M., which are ochreous yellow on the last whorl and bandless; one exhibits a very narrow dark brown patch occupying the groove at the root of the columella and extending a short way behind the basal lip; it can also distinctly be traced beneath the parietal callus around the columellar fold. This specimen has a white lip.

Var. vicaria, *Fulton.*

Bulimus sinensis, Forbes & Hanley, Conch. Ind. 1870, pl. 21, figs. 5, 6.
Amphidromus sinensis, var. *vicaria*, Fulton, A. M. N. H. ser. 6, xvii, 1896, p. 80; Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 191 (*vicarius*), pl. 62, figs. 67–69.

"In most collections as *sinensis*, from which it differs in being not so broad in proportion to its length and in coloration. It is broader than *sylheticus*, and instead of being of an uniform green colour, it is yellow, with two (sometimes three) more or less distinct dark brown bands encircling lower part of last whorl. This variety varies a great deal in size and form. I give here the dimensions of two specimens out of a series in the British Museum: Long. 33 mm., maj. diam. 17 mm.; long. 21 mm., maj. diam. 14 mm." (*Fulton.*)

Hab. Burma: Pegu; Chittagong.

With regard to its being "not so broad in proportion to its length," this is a character not always to be relied upon, as I possess a specimen, received from Mr. Fulton, which measures; Long. 20, diam. 12 mm. The same remark applies to its relative proportion as compared with *A. sylheticus*, as will be seen from the following observation.

"A specimen from Chittagong (fig. 69) is more slender than *A. sylheticus*, not 'baggy' below, and almost white with a faint ochre band above each of the purple-black ones. The apical whorls are corneous-white, and weakly punctate, and there is a perceptible groove at the root of the columella. The peristome is pure white,

and there is no dark stripe behind the lip. Alt. 26, diam. 14·5, longest axis of aperture 13 mill." (*Pilsbry.*)

Var. gracilis, *Fulton.*

Amphidromus sinensis, var. *gracilis*, Fulton, A. M. N. H. ser. 6, xvii, 1896, p. 80, pl. 6, fig. 10; Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 192, pl. 62, fig. 71.

"A very narrow solid form; pale yellow, with two purple-brown bands at lower part of last whorl; the third and fourth whorls encircled with four rows of light brown spots; lip and columella thickened and expanded." (*Fulton.*)

Pilsbry suggests that this form may belong nearer *A. flavus*; but *gracilis* is much more slender and has a more elongated aperture.

Hab. Burma: Pegu.

158. **Amphidromus andamanicus**, *Hanley & Theobald.*

Bulimus andamanicus (Thorp MS.), Hanley & Theobald, Conch. Ind. 1875, p. 59, pl. 148, fig. 10.

Amphidromus sp., Nevill, Hand List, i, 1878, p. 127, no. 21.

Amphidromus andamanicus, var. *nicobarica* (Nevill MS.), Godwin-Austen, P. Z. S. 1895, p. 450.

Amphidromus furcillatus, var. *andamanica*, Fulton, A. M. N. H. ser. 6, xvii, 1896, p. 77.

Amphidromus andamanicus, Pilsbry, Man. Conch. ser. 2, xiii, 1900, p. 217, pl. 66, fig. 41.

Shell sinistral, elongate-conoid, smooth and glossy, finely striated and covered with close minute spirals; the protoconch white or buff-white with a pale or dark brown apex, the later whorls pale or dark buff, marked with transverse (sometimes oblique) broad dark brown or blackish bars, some of which are occasionally forked at the upper extremity; they increase in width and become more distant on the later whorls, but on the last whorl decrease and become more crowded, the lower half of the whorl being covered by two rather broad spiral bands, one infra-peripheral and the other placed around the columella, the two sometimes coalescing; the latter part of the last whorl is sometimes covered with light or dark green which is occasionally disposed in transverse streaks; a narrow brown sub-sutural band, edged with white, ascends the greater part of the spire. Whorls 6–6½, convex. Aperture semi-ovate, three-sevenths the length of the shell; peristome white, rather thin, slightly expanded, not reflexed; parietal callus very thin; columella white, vertical, straight, making a distinct angle with the basal margin, reflexed and adnate at the insertion, leaving a slight narrow slit of the umbilicus.

Length 35, diam. 19 mm.; height of aperture 15, width 8·5 mm.

Length 30, diam. 16·5 mm.; height of aperture 13, width 7·5 mm.

Hab. Andaman Islands: Cocos Islaud and Port Blair (*Godwin-Austen*); Mt. Harriet, Andaman Island (*Roepstorff*, *Nevill*, *Stoliczka*). Nicobar Islands: Katchall (*Stoliczka*).

This species has not previously been described and is known only from the figure in Couch. Ind. copied by Pilsbry. The above description is drawn up from a number of specimens in my own collection. Mr. Fulton considers it variety of *A. furcillatus*, Mousson, a Javanese shell, but Prof. Pilsbry, while admitting that the similarity in colouring to that species and *A. quadrasi*, from Balabac, is remarkable, thinks it inadvisable, on account of the widely separated localities, to unite *andamanicus* with either. I do not, however, consider the similarity in colouring particularly striking, as in the other two species the prevailing ground-colour is a bright yellow, and I have never seen the infra-peripheral and columellar bands, so characteristic a feature in *A. andamanicus*, in either. *A. furcillatus*, moreover, is a more slender species and has the columella more oblique aud the aperture proportionally less high.

On the other hand *A. pictus*, Fulton, also from Java, bears a striking resemblance in its pattern of marking to the Andaman shell, having several of the transverse bars forked above and exhibiting likewise the infra-peripheral and columellar spiral bands. It has also the same conical contour, but lacks the green colouring on the last whorl frequently seen in *A. andamanicus*.

Lt.-Col. Godwin-Austen, in discussing the form from the Nicobar group, states that "it is somewhat larger than Andaman shells, and in colour is far paler and with few markings, and those pale. These differences might not hold good in a large series."

Subgenus Beddomea, *Nevill.*

Amphidromus, subgenus *Beddomea*, Nevill, Hand List, i, 1878, p. 127; Pilsbry, Proc. Malac. Soc. London, iv, 1901, p. 158, pl. 16 (anatomy); ibid., Man. Conch. ser. 2, xiv, 1901, p. 1, pl. 2, figs. 21–23 (anatomy).

Type, *Bulimus ceylanicus*, Pfeiffer.

Range. Southern India and Ceylon.

"Shell umbilicate or perforate, oblong-conic, often carinated at the periphery, white or with brown bands or streaks; aperture usually quite oblique; peristome reflexed.

"Genitalia of typically epiphallogonous type, the flagellum longer than and the ephiphallus about as long as the peuis. Duct of the oblong or ovate spermatheca lengthened, more than double the length of the peuis. Penis with a large apical papilla.

"Lung having the pulmonary vein without large branches, the venation densest on the intestinal side and near the pueumostoma, weak or well developed on the cardiac side. Kidney long and

narrow, nearly or quite the length of the pericardium. Ureter reflexed, the secondary ureter a closed tube.

"Muscles: Retractor of the penis inserted on the diaphragm as usual. The pharyngeal retractor is united to the right ocular and pedal band far forward; the left ocular muscle passes to the right of the genitalia, not between the male and female branches.

"Jaw well arched, thin, with its lower margin crenulated by 10–14 flat ribs, which seem separated by narrow intervals in the median part, but are contiguous or overlapping towards the ends. It is similar to that of some species of *Papuina*, intermediate between the plaited and the ribbed types.

"Radula of the usual form in Helicidæ. The transverse rows of teeth bent at a wide angle in the middle. Rhachidian and admedian teeth with single, long, broadly rounded cusps. These pass by a gradual transition to the lateral type, in which the tooth is inclined and bears a three-lobed cusp.

"The shell does not have the brilliant coloring of many *Amphidromus*, and is minutely punctulate, at least on the spire. The area of distribution is separated from that of true *Amphidromus*. I have elsewhere shown that *Beddomea* agrees with *Amphidromus* in the long, band-like kidney, the pattern of lung-venation, the arrangement of the muscles (except the eyes and retractors), the reproductive system, and the jaw. It differs from *Amphidromus* in having the eye retractor muscles to the right of, instead of between the branches of the genitalia, in having the cusps of the teeth of the median fold of the radula broadly rounded and simple instead of deeply cloven into three cusps, as all the side-teeth are in the restricted group of *Amphidromus*; and finally in having the radula longer than in *Amphidromus*.

"In view of the general agreement, it scarcely seems well-advised to accord *Beddomea* higher rank than that of a subgenus of *Amphidromus*. None of the three structural differences mentioned is of much importance, though I do not doubt that they will prove constant in *Beddomea*. When some of the species of *Amphidromus* which are conchologically nearest *Beddomea* (such as *A. sylheticus*) come to be examined, transitions may not unlikely be found in the dentition. In the long flagellum, *Beddomea* is more like the larger, amphidrome species of *Amphidromus* than the smaller, invariably sinistral species, which, so far as known, have this organ much shorter." (*Pilsbry*.)

Key to the Species.

i. Solid and opaque, variegated with brown bands or stripes.
   a. Shell elongate-conoid .... *trifasciatus*
   b. Shell pyramidal.................................. *bontiæ.*
ii. Rather thin, very pale or white, without dark markings.

a. Periphery rounded .... *ceylanicus.*
b. Periphery angular.
  b^1. Shell elongate-conoid, whorls convex .... *intermedius.*
  b^2. Shell pyramidal, whorls flattened .... *physalis.*
c. Periphery strongly carinate.
  c^1. Dextral; Ceylon .... *albizonatus.*
  c^2. Sinistral; Southern India .... *calcadensis.*

159. **Amphidromus trifasciatus**, *Gmelin.*

Helix trifasciatus tranquebarica, Chemnitz, Conch.-Cab. ix, part 2, 1786, p. 155, pl. 134, figs. 1215.
Helix trifasciata, Gmelin, Syst. Nat. i, part 6, 1790, p. 3642.
Bulimus trifasciatus, Bruguière, Encycl. Méth., Vers, i, 1789, p. 317; Reeve, Conch. Icon. v, *Bulimus*, 1848, pl. 39, fig. 237; Pfeiffer, Conch.-Cab., *Bulimus*, 1853, p. 50, pl. 10, figs. 6, 7, var. pl. 41, figs. 16, 17; Layard, A. M. N. H. ser. 2, xi, 1853, p. 226; Hanley & Theobald, Conch. Ind. 1870, pl. 21, fig. 3.
Bulimus (*Amphidromus*) *trifasciatus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 147.
Buliminus (*Cerastus*) *trifasciatus*, von Martens, Die Heliceen, ed. 2, 1860, p. 232; Nevill, Hand List, i, 1878, p. 132.
Amphidromus trifasciatus, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 295.
Buliminus (*Beddomea*) *trifasciatus*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 677, pl. 102, fig. 22.
Amphidromus (*Beddomea*) *trifasciatus*, Pilsbry, Man. Conch. ser. 2, xiv, 1901, p. 3, pl. 1, figs. 1-6, 8.
Rhachis trifasciata, Kobelt & Möllendorff, Nachr. D. Malak. Gesells. 1903, p. 39.
Bulimus ceylanicus, Hanley & Theobald, Conch. Ind. 1870, p. 11, pl. 21, fig. 2; 1875, p. 59, pl. 148, fig. 9.
Buliminus (*Beddomea*) *ceylanicus*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, pl. 103, figs 5, 6.
Amphidromus (*Beddomea*) *ceylanicus*, Pilsbry, Proc. Malac. Soc. London, iv, 1901, p. 159, pl. 16, fig. 3 (jaw).
Bulimus fuscoventris, Benson, A. M. N. H. ser. 2, xviii, 1856, p. 96 (=juv.).

"T. umbilicata, ovato-oblonga, solidula, minutissima striatula, nitida, albida, fulvido-nebulosa, fasciis pluribus (plerumque 3) castaneis ornata; spira conica, acutiuscula; anfr. 6 planiusculi, ultimus $\frac{3}{7}$ longitudinis æquans; columella subrecta; apertura ovalis; perist. album, late expansum, margine columellari dilatato, patente." (*Pfeiffer.*)

"Long. 27, diam. 13 mill. Ap. intus 11 mill. longa, 7 lata."

Hab. India: Tranquebar (*Chemnitz*) [?]. Ceylon: Tamanka (*Layard*); Matella, Colombo, Uda Pussellawa (*Collett*).

The species varies in size. I possess specimens 30 mm. long, 16 mm. in diameter. One has the upper two bands confluent, forming a broad zone which ascends the whole spire; another shows one distinct narrow band, with two indistinct ones on either side on the upper portion of the latter part of the last whorl,

while the lower portion is ornamented with a broad dark brown band below the peripheral white girdle and a narrow one around the umbilicus. Another specimen is almost unicolorous white with a narrow brown band around the umbilicus. The original habitat—Tranquebar—recorded by Chemnitz, I consider extremely doubtful. It is a well known fact that formerly less importance was attached to locality than is the case at the present day.

Var. **rufopicta**, *Benson.*

Bulimus rufopictus, Benson, A. M. N. H. ser. 2, xviii, 1856, p. 96; Hanley & Theobald, Conch. Ind. 1870, pl. 21, fig. 10.
Bulimus (Cerastus) rufopictus, Nevill, Hand List, ii, 1878, p. 132.
Amphidromus rufopictus, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 295.
Buliminus (Beddomea) rufopictus, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 670, pl. 102, fig. 11.
Amphidromus (Beddomea) trifasciatus, var. *rufopictus*, Pilsbry, Man. Conch. ser. 2, xiv, 1901, p. 5, pl. 1, fig. 9.

Smaller than typical *trifasciata* and having the upper portion of the spire usually streaked transversely.
Hab. Ceylon: Akurambode (*Layard*); Kandy (*Collett*).

160. **Amphidromus bontiæ**, *Chemnitz.*

Helix bontia, Chemnitz, Conch.-Cab. ix, part 2, 1786, p. 156, pl. 134, figs. 1216, 1217.
Bulimus bontia, Gray, Ann. Philos., N. S. ix, 1825, p. 414.
Bulimus bontiae, Pfeiffer, Conch.-Cab., *Bulimus*, 1841, pl. 10, figs. 8, 9; 1853, p. 51; Reeve, Conch. Icon. v, *Bulimus*, 1848, pl. 48, fig. 315; Hanley & Theobald, Conch. Ind. 1874, p. 34, pl. 80, fig. 5.
Amphidromus (Beddomea) bontiæ, Nevill, Hand List, i, 1878, p. 128.
Buliminus (Beddomea) bontiae, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 669, pl. 102, fig. 10.
Rhachis bontiae, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 37.

Shell narrowly perforate, ovate-conoid, thin, faintly striated transversely, with microscopic impressed spiral lines above and below, white, with three narrow pale brown bands, the middle one at the periphery. Spire conoid, apex acute, suture shallow. Whorls 5, slightly convex; the last ventricose, scarcely descending in front, equalling in height the remainder of the spire, at first subangulate at the periphery, becoming rounded towards the mouth. Aperture pyriform-obovate; peristome thin, margins slightly expanded, columellar margin dilated and reflexed over the narrow perforation of the umbilicus.

Long. 28, diam. 18 mm.
Hab. India: Bengal (*König*); Southern India (*Jerdon, Stoliczka*).

This species in contour approximates most nearly to *A. physalis*, but the shell is thinner and is ornamented with narrow pale brown spiral fasciæ. The specimen figured in Conch. Ind. only possesses two bands, whereas the type, figured by Chemnitz, has three. The shell depicted by Reeve, from Benson's collection, is also encircled by three bands. The specimen in the Benson collection —presumably the one figured by Reeve—kindly forwarded to me for inspection by Dr. L. Doncaster, in charge of the University Museum of Zoology, Cambridge, has somewhat deteriorated, having a considerable hole in the body-whorl and two small ones near the parietal callus; the peristome is also damaged. This is probably owing to its having been stuck on a tablet. The above diagnosis has been drawn up from this shell.

161. **Amphidromus physalis**, *Benson.*

Bulimus physalis, Benson, A. M. N. H. ser. 2, xix, 1857, p. 328; Blanford, J. A. S. B., xxxv, 1866, p. 38; Hanley & Theobald, Conch. Ind. 1870, pl. 21, fig. 9.

Helix (*Geotrochus*) *physalis*, von Martens, Die Heliceen, ed. 2, 1860, p. 168.

Amphidromus (*Beddomea*) *physalis*, Nevill, Hand List, i, 1878, p. 127; Pilsbry, Man. Conch. ser. 2, xiv, 1901, p. 8, pl. 1, fig. 13.

Helix (*Corasia*) *physalis*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 200.

Buliminus (*Beddomea*) *physalis*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 678, pl. 103, fig. 1.

Original description:—"Testa subobtecte perforata, ovato-conica, tenuiuscula, oblique striatula, albida, nitente; spira conica, apice obtusato; sutura leviter impressa; anfractibus 5½ superne subplanatis, primis granulatis, cæteris striis spiralibus minutissimis decussatis, ultimo tumidiusculo $\frac{4}{9}$ longitudinis æquante, ad peripheriam plerumque angulato, apertura ampla, obliqua, truncato-pyriformi; peristomate expanso, marginibus reflexis, callo tenui junctis, columellari superne latissimo, appresso, oblique leviter impresso, umbilicum angustum pervium fere tegente." (*Benson.*)

Long. 27–28, diam. 16–17 mm.; long. ap. 14–16, lat. 9–10 mill.

Hab. India: Khoonda Ghat, Nilgiris (*Jerdon*); Anamullay Hills (*Beddome*).

"Well distinguished from the Cingalese species: *albizonatus*, *ceylanicus*, and *intermedius*, by its ventricose form, the more ample aperture, and the mode of sculpture. A perfect specimen in the Museum of Indian House and a young one from Dr. Jerdon have the periphery angulate, an adult specimen of Dr. Jerdon's being deficient in this feature." (*Benson.*)

162. **Amphidromus albizonatus**, *Reeve.*

Bulimus albizonatus, Reeve, Conch. Icon. v, *Bulimus*, 1849, pl. 81, fig. 604; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 330; ibid., Conch.-Cab., *Bulimus*, 1854, p. 155, pl. 49, figs. 1, 2; Hanley & Theobald, Conch. Ind. 1870, pl. 21, fig. 8.

Bulimus ceylanicus, var. *albizonatus*, Layard, A. M. N. H. ser. 2, xi, 1853, p. 226.
Helix (*Geotrochus*) *albizonata*, von Martens, Die Heliceen, ed. 2, 1860, p. 168.
Bulimus (*Amphidromus*) *albizonatus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 147.
Amphidromus (*Beddomea*) *albizonatus*, Nevill, Hand List, i, 1878, p. 127; Pilsbry, Proc. Malac. Soc. London, iv, 1901, p. 159, pl. 16, figs. 1, 5 (anatomy); ibid., Man. Conch. ser. 2, xiv, 1901, p. 7, pl. 1, figs. 14–16.
Cochlostyla (*Phengus*) *albizonata*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 210.
Buliminus (*Beddomea*) *albizonatus*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 680, pl. 103, fig. 4.

"T. perforata, elongato-conica, solidiuscula, oblique striatula, vix nitidula, sub epidermide pallide straminea albida; spira conica, obtusa; sutura submarginata; anfr. 6 plani, ultimus spira paulo brevior, infra medium acute angulatus et albo zonatus; columella leviter arcuata; apertura obliqua, truncato-ovalis, subtetragona; perist. late expansum, marginibus subparallelis, callo tenui junctis.

"Long. 24, diam. 15 mill. Ap. c. perist. 13·5 mill. longa, 10 lata." (*Pfeiffer.*)

Hab. Ceylon (*Nevill*); Matella (*Layard*); Galle (*Reeve*); Udagama (*Collett*).

In discussing the present species, Prof. Pilsbry states "numerous specimens before me are smaller than Reeve's type, measuring from length 29, diam. 18, to length 23, diam. 14 mill. The thin cuticle is more or less yellow tinted beneath, and the periphery either marked by a white line or not. *The angle is frequently almost completely* obsolete on the face of the whorl, even when strong on the back. The spire is punctulate or densely subgranulose, at least above, but not on the last whorl."

He continues "Kobelt (Conch.-Cab. p. 680) states that he gives the figure from Conch. Icon. on his plate 103, fig. 4, but he evidently did not do so." Here Pilsbry confuses Conch. Icon. with Conch. Ind., for Dr. Kobelt states that his figure is copied from the latter, and a comparison with that work at once establishes the fact that the figure there given constituted the basis of his illustration.

Var. **simoni**, *Jousseaume.*

Phengus simoni, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 296, pl. 4, fig. 7.
Amphidromus (*Beddomea*) *albizonatus*, var. *simoni*, Pilsbry, Man. Conch. ser. 2, xiv, 1901, p. 7, pl. 1, figs. 17, 18.

Is said to differ from typical *albizonatus* in having one whorl less, a more prominent keel, more flattened whorls, in the shell being white, and in the absence of a white keel-zone. Pilsbry figures a shell from Udagama, received by him from Collett. I have not seen authentic specimens, but the variety does not appear to me to be well differentiated.

163. Amphidromus intermedius, *Pfeiffer*.

Bulimus intermedius, Pfeiffer, P. Z. S. 1854, p. 291; ibid., Novit. Conch. ser. 1, i, 1855, p. 30, pl. 8, figs. 10, 11; Hanley & Theobald, Conch. Ind. 1870, pl. 19, figs. 6, 8.
Helix (Geotrochus) mesogena (nom. mut.), von Martens, Die Heliceen, ed. 2, 1860, p. 168.
Bulimus (Amphidromus) intermedius, Pfeiffer, Malak. Blätt. ii, 1856, p. 147.
Amphidromus (Beddomea) intermedius, Nevill, Hand List, i, 1878, p. 127; Pilsbry, Proc. Malac. Soc. London, iv, 1901, p. 158, pl. 16, figs. 2, 4, 6, 7 (anatomy).
Cochlostyla (Phengus) intermedia, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 210.
Buliminus (Beddomea) intermedius, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 679, pl. 103, figs. 2, 3.
Amphidromus (Beddomea) ceylanicus, var. *intermedius*, Pilsbry, Man. Conch. ser. 2, xiv, 1901, p. 6, pl. 1, figs. 10–12.

Original description:—"T. perforata, elongato-conica, solidula, oblique striatula et puncturata, nitida, alba; spira conica, obtusula; sutura levis, simplex; anfr. 6 planiusculi, ultimus $\frac{3}{7}$ longitudinis subæquans, infra medium subangulatus, basi turgidus; columella leviter plicata, subrecedens; apertura obliqua, truncato-ovalis; perist. sublate expansum, reflexiusculum, marginibus callo tenui junctis, columellari plano, dilatato, triangulari.

"Long. 34, diam. 16 mill., ap. c. perist. 17 mill. longa, intus 8 lata." (*Pfeiffer*.)

Hab. Ceylon (*Thwaites*, *Nevill*).

A. intermedius is more angulate at the periphery than *A. ceylanicus*, the apex is more obtuse and the columellar margin more triangularly dilated and flattened.

164. Amphidromus ceylanicus, *Pfeiffer*.

Bulimus ceylanicus, Pfeiffer, Symb. Hist. Helic. iii, 1846, p. 83; ibid., Mon. Helic. Viv. ii, 1848, p. 59; Reeve, Conch. Icon. v, *Bulimus*, 1848, pl. 43, fig. 274; Deshayes in Férussac, Hist. Nat. Moll. ii, part 2, 1851, p. 70, pl. 145, figs. 5, 6; Layard, A. M. N. H. ser. 2, xi, 1853, p. 226; Hanley & Theobald, Conch. Ind. 1870, pl. 21, fig. 2.
Bulimus (Amphidromus) ceylanicus, Albers, Die Heliceen, 1850, p. 139.
Helix (Geotrochus) ceylanica, von Martens, Die Heliceen, ed. 2, 1860, p. 168.
Amphidromus (Beddomea) ceylanicus, Nevill, Hand List, i, 1878, p. 127; Pilsbry, Man. Conch. ser. 2, xiv, 1901, p. 5, pl. 1, fig. 7.
Cochlostyla (Phengus) ceylanica, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 210.
Buliminus (Beddomea) ceylanicus, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 680 (excl. figures).

Original description:—"T. aperte perforata, ovato-conica, solida, oblique striatula, nitidula, alba; spira conica, acutiuscula; anfr. 6

planiusculi, ultimus $\frac{3}{7}$ longitudinis subæquans; columella leviter arcuata; apertura truncato-ovalis; perist. late expansum, reflexiusculum, margine columellari dilatato, reflexo, patente." (*Pfeiffer.*)

Long. 27, diam. 14 mm.

Hab. Ceylon (*Templeton*); S. Prov. (*Nevill*).

165. **Amphidromus calcadensis**, *Blanford.*

Bulimus calcadensis (Beddome MS.), Blanford, J. A. S. B. xxxix, 1870, p. 18; Hanley & Theobald, Conch. Ind. 1875, pl. 148, figs. 2, 3.

Geotrochus calcadensis, Theobald, J. A. S. B. xlv, 1876, p. 187, pl. 14, fig. 7.

Amphidromus (*Beddomea*) *calcadensis*, Nevill, Hand List, i, 1878, p. 127; Pilsbry, Man. Conch. ser. 2, xiv, 1901, p. 9, pl. 1, figs. 19, 20.

Cochlostyla (*Phengus*) *calcadensis*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 210.

Buliminus (*Beddomea*) *calcadensis*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 681, pl. 103, figs. 7, 8.

Original description :—"Testa sinistrorsa, sub-obtecte perforata, elevato trochiformis, solidula, striatula, albida, epidermide fulva? (vel flavescenti, forsan varie colorata) obtecta; spira conica; apice obtuso; sutura impressa. Anfr. $5\frac{1}{2}$ convexi, regulariter crescentes, ultimus $\frac{3}{7}$ longitudinis sub-æquans, carinatus, subtus convexus, antice tumidior. Apertura diagonalis, sub-rhomboidea; peristoma non incrassatum, expansiusculum, marginibus distantibus, callo tenui junctis, columellari triangulatim reflexo, perforationem fere tegente.

"Long. 23, diam. 17 mm., ap. c. perist. 11 mill. longa, intus 8 lata." (*Blanford.*)

Hab. India: Calcad Hills, Travancore (*Beddome*).

"Of this peculiar sinistral heliciform *Bulimus* a solitary specimen, much weathered but perfect, was found by Major Beddome. It is evidently a coloured shell but only traces of the epidermis remaining. It is allied to *B. albizonatus*, Rv., and *B. intermedius*, Pfr., of Ceylon, but is sinistral and has a shorter, more conical form." (*Blanford.*)

A specimen in the Theobald collection in the British Museum, probably the one figured in Conch. Ind., although also rather weathered, has the periostracum intact on some parts of the last whorl and exhibits traces of extremely minute spiral sculpture, a feature also observed in other species of *Beddomea*. The peripheral keel is ornamented with a narrow pale brown band which can be traced some distance up the spire, and the protoconch is pale fuscous. It measures: length 19, diam. 14·5 mm.

Genus **APATETES**,* g. n.

Shell conoid, rather thin, carinate, covered perforate.

166. **Apatetes bourdilloni**, *Theobald.*

Corasia bourdillonii, Theobald, J. A. S. B. xlv, 1876, p. 185, pl. 15, fig. 3.
Nanina bourdilloni, Nevill, Hand List, i, 1878, p. 30.
Cochlostyla (*Corasia*) *bourdillonii*, Pilsbry, Man. Conch. ser. 2, vii, 1891, p. 127, pl. 33, fig. 55.

Original description:—"Testa conoidea, obtecto-perforata, carinata, tenui, polita, albida, translucente, sub epidermide pallide straminea et decidua lineis exilissimis flexuosis spiraliter ornata. Anfractibus 4½, celeriter crescentibus, ad apicem mammillatum paulo convexis, sed ultimo supra planato et circa umbilicum paulo inflato. Apertura magna subquadrata; marginibus simplicibus callo tenuissimo junctis.

"Diam. maj. 25·4, min. 19·5, alt. 14·8, aperturæ alt. 16, ejusdem lat. 14 mm." (*Theobald.*)

Hab. India: Trevandrum, prov. Travancore (*Theobald*).

As Prof. Pilsbry correctly observes: "judging from the sharp lip, as well as the locality, this is no *Corasia*. It may prove to be a *Nanina*." Pending further information he, however, considered it advisable to retain it there, although in vol. ix of the Manual of Conchology he does not include it in the genus. Its position is very uncertain, and it is not at all improbable that the thin, sharp, peristome is an indication that the specimens are not full-grown. I was at first inclined to regard it as a member of the genus *Euplecta*, but the elevated conoid spire and its superficial, incised, close, wavy spirals—so totally different from the sharply cut, decussating spirals to be observed in that genus—are features which do not, I consider, permit its inclusion there. The texture of the shell rather approaches that exhibited by the subgenus *Beddomea* and I, therefore, propose to place this new genus provisionally next to *Amphidromus.*

Genus **GANESELLA**, *Blanford.*

Ganesella, Blanford, A. M. N. H. ser. 3, xi, 1863, p. 86; Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 168, pl. 60, figs. 1, 2, frontispiece, figs. 1, 2 (anatomy) (*G. japonica*).
Satsuma, A. Adams, A. M. N. H. ser. 4, i, 1868, p. 463; Kobelt in Semper, Reisen Philipp. x, 1906, p. 53.
Trochomorphoides, Nevill, Hand List, i, 1878, p. 80.
Fruticotrochus, Kobelt, Fauna Moll. Extramar. Japoniae, 1879, p. 48.

Type, *Helix capitium*, Benson.

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* απατητης, a deceiver.

Range. India and Farther India to China and Japan, Malay Archipelago and Philippine Islands.

"Shell more or less trochiform, umbilicated (or rarely imperforate), rather thin; light coloured, plain or with a peripheral line; surface with growth-lines only or densely spirally striate; whorls $4\frac{1}{2}$ to 6, the last a little descending in front. Aperture oval or angular-lunate, oblique, toothless or with a blunt columellar fold; lip expanded, broadly dilated at columellar insertion.

"Animal (of *G. japonica*) with *the foot very long and narrow*, sole not distinctly tripartite; upper surface finely and feebly granular, back with a pair of dorsal grooves, no facial grooves; tail narrow, long, *with a median longitudinal* groove above.

"Jaw arcuate, with about 9 ribs denticulating the lower margin.

"Radula of the type usual in ground snails. Middle tooth with mesocone only developed, shorter than basal plate, side-cusps represented by slight lateral extensions. Laterals similar but with the cusp longer. Marginals with oblique, bifid inner cusp and an ectocone.

"Genital system having the penis long and twisted, ending in a curved blind sack with corrugated inner walls; epiphallus long, bearing the retractor, terminating in a flagellum and the vas deferens. Vagina extremely long, the spermatheca duct inserted high. Spermatheca oblong, on a stout duct, neither duct nor bulb being bound to uterus. No dart sack or mucus glands." (*Pilsbry*.)

167. Ganesella acris, *Benson*.

Helix acris, Benson, A. M. N. H. ser. 3, iii, 1859, p. 387; Hanley & Theobald, Conch. Ind. 1870, pl. 54, fig. 6.
Helix (*Trochomorphoides*) *acris*, Godwin-Austen, J. A. S. B. xlv, 1876, p. 312; Nevill, Hand List, i, 1878, p. 80.
Helix (*Patula* (*Trochomorpha*)) *acris*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 74, pl. 14, fig. 1.
Ganesella acris, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 170.
Helix puellula (Benson, MS.), Theobald, J. A. S. B. xxiii, 1858, p. 319 (nom. nud.).

Original description:—"Testa anguste umbilicata, elevato-conica, trochiformi, oblique striatula, obsolete granulosa, subtus minutissime spiraliter striata, albida; spira elongato-conica, lateribus planis, apice obtusiusculo, sutura leviter impressa; anfractibus $6\frac{1}{2}$ planulatis, ultimo vix descendente, ad peripheriam acute carinato, basi planiusculo; apertura valde obliqua, tetragono-lunata, peristomate superne expansiusculo, subtus expanso, reflexiusculo, margine columellari late angulato-reflexo, umbilicum partim celante.

"Diam. maj. 10, min. 9, axis 9 mill." (*Benson*.)

Hab. India: Khasi Hills, Teria Ghat (*Theobald*, *Godwin-Austen*); Naga Hills (*Roberts*); Dafla Hills (*Godwin-Austen*).

Benson states that it approaches the larger *H. capitium*, of the hill region south of the Gangetic angle; but besides the absence of the peculiar colouring of that species, it is distinguished by its more elongate and regular conical form and by the flatter base. He continues, "I had affixed the MS. name of *puellula* to this shell in my report to Mr. Theobald; but on account of its similarity to *H. puella* of the late Mr. W. J. Broderip, I have deemed it advisable to adopt a more distinct and expressive designation on publishing a description."

The shell Benson had before him when describing the species was much weathered, and he thought that the sculpture and colour might eventually require an amended description. He referred to a faint rufous tint, not to be detected elsewhere, towards the termination of the keel. A specimen in my collection, with the periostracum in excellent condition, enables me to confirm this and to supplement the description in this respect. The shell is whitish corneous and the keel has a narrow rufous border above and below; this can be traced a long way up the spire.

Dautzenberg and Fischer* unite with the present species a shell from Tonkin previously described by them as *Satsuma lantenoisi*. Another form from Perak, described by Crosse as *Helix (Geotrochus) perakensis*, they consider merely a variety of *G. acris*.

168. Ganesella scenoma, *Benson*.

Helix scenoma, Benson, A. M. N. H. ser. 3, xi, 1863, p. 319; Hanley & Theobald, Conch. Ind. 1870, pl. 53, fig. 5, var. figs. 3, 4.
Helix (Planispira) scenoma, Nevill, Hand List, i, 1878, p. 79.
Helix (Geotrochus) scenoma, Pfeiffer & Clessin, Nomencl. Helic Viv. 1881, p. 193; Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1899, p. 325.
Helix (?Satsuma) scenoma, Pilsbry, Man. Conch. ser. 2, vii, 1891, p. 83, pl. 18, fig. 54, var. fig. 53.
Ganesella scenoma, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 170.

Original description:—"H. testa anguste infundibuliformi-umbilicata, subgloboso-conoidea, oblique irregulariter striata, striis minutissimis spiralibus decussata, sub epidermide cornea albida, carina interdum fascia rufo-castanea ornata; spira conoidea, apice obtusiusculo, sutura impressa; anfractibus 6, convexiusculis, ultimo antice vix descendente, ad peripheriam obtuse subcompresso-carinato, subtus convexo, circa umbilicum compresso; apertura obliqua, subquadrato-lunata, peristomate expansiusculo, margine columellari reflexiusculo." (*Benson.*)

Diam. maj. 16, min. 14, axis 11 mill.

Hab. Burma: Moulmain (*Benson*, *Fea*); Pegu (*Theobald*, *Nevill*).

* Journ. Conchyl. lvi, 1908, p. 181.

The most depressed of all the Indian forms of *Ganesella*, somewhat resembling the Siamese *G. rostrella*. The peripheral band is sometimes absent. A slightly more elongated variety is figured in Conch. Ind. (pl. 53, figs. 3, 4).

Some shells labelled *H. pilidion*, in the Theobald collection, British Museum, proved upon examination to pertain to the present species. One of these, measuring 15 : 13 : 9·25 mm., has the peripheral band on the pinched keel, but the others are without the band; they are all more depressed than typical *scenoma*, while the umbilicus is somewhat narrower.

169. **Ganesella capitium**, *Benson.*

Helix capitium, Benson, A. M. N. H. ser. 2, ii, 1848, p. 160; Reeve, Conch. Icon. vii, 1852, pl. 125, fig. 749; Pfeiffer, Conch.-Cab., *Helix*, iii, 1854, p. 291, pl. 125, figs. 3, 4; Hanley & Theobald, Conch. Ind. 1870, pl. 14, fig. 5; Morelet, Ser. Conch. iv, 1875, p. 254.

Nanina (Trochomorpha) capitium, von Martens, Die Heliceen, ed. 2, 1860, p. 61.

Helix (Planispira) capitium, Nevill, Hand List, i, 1878, p. 78.

Helix (Ganesella) capitium, Nevill in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 880.

Trochomorpha (Nigritella) capitium, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 81.

Helix (Patula (Trochomorpha)) capitium, Tryon, Man. Conch. ser. 2, iii, 1887, p. 74, pl. 14, fig. 99.

Trochomorpha capitium, Morelet, Journ. Conchyl. xxxvii, 1889, p. 125; P. Fischer, Bull. Soc. Hist. Nat. Autun, iv, 1891, p. 108.

Ganesella capitium, Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 170, pl. 55, fig. 18; Blanford, Proc. Malac. Soc. London, v, 1903, p. 278.

Euloia (Ganesella) hariola, subsp. *carinella*, Möllendorff, Nachr. Blatt D. Malak. Ges. xxxiv, 1902, p. 158.

Original description:—"Testa perforata, globoso-conica, subtrochiformi, lævigata, absque nitore, rufescente cornea, subdiaphana, opaciter albido-laciniato-strigata et marmorata; spira conica, apice obtuso; anfractibus 5½ convexiusculis, ultimo carina filiformi cincto, basi convexa; sutura impressa, marginata; apertura rotundato-tetragona; peristomate recto, supra expansiusculo, infra subreflexo; margine columellari late reflexo perforationem semitegente." (*Benson.*)

Diam. maj. 14, min. 13, axis 11 mm.

Hab. India: Sikrigali, Behar (*Boys*). Upper Burma: Ava (*Blanford*), Kabyuet and Kalawat (*Anderson*). Siam (*Bocourt*, *Pavie*, *Daly*, *Roebelen*, *Fruhstorfer*). Cambodia (*Mouhot*, specimens in Cuming Coll. Brit. Mus.).

A brightly coloured species, the dark brown cuticle being irregularly covered by flammulated streaks of opaque creamy white.

This bright coloration would naturally lead to the inference that the animal is of arboreal habit and it is not, therefore, surprising to find that Blanford records with regard to *hariola*—a closely allied form—that it is found chiefly on trees. A feature, to which no reference appears to have been made by any writer, is the presence, not only on the protoconch but as far as the third whorl, of densely crowded, minute pits, apparently arranged in obliquely descending spirals. I have not observed these pits beyond the third whorl in any specimen to which I have had access. Möllendorff records specimens from Siam measuring 16·8 mm. in diameter, thus considerably exceeding the type.

Var. **hariola**, *Benson.*

Helix hariola, Benson, A. M. N. H. ser. 2, xviii, 1856, p. 251; Pfeiffer, Novit. Conch. ser. 1, i, 1860, p. 134, pl. 36, figs. 21, 22; Blanford, J. A. S. B. xxxiv, 1865, p. 93; Hanley & Theobald, Conch. Ind. 1870, pl. 14, fig. 6.

Helix (Planispira) capitium, var. *hariola,* Nevill, Hand List, i, 1878, p. 78.

Helix (Patula (Trochomorpha)) capitium, var. *hariola,* Tryon, Man. Conch. ser. 2, iii, 1887, p. 74, pl. 14, fig. 100.

Helix (Ganesella) hariola, Godwin-Austen, P. Z. S. 1888, p. 242 (+var. *carinata* as of Blanford); Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 328.

Ganesella capitium, var. *hariola,* Pilsbry, Man. Conch. ser. 2, ix, 1894, p. 170.

Helix (Ganosella) hariola, von Martens, Arch. Naturg. lxv, i, 1899, p. 32.

Hab. Burma: Thyet Myo (*Theobald*); Prome (*Anderson*); Puppa Hill, near Pagan (*Blanford*); Khagan and Hlindet (*Spratt*); Prome (*Fea*); Pyinthia near Mandalay (*Nötling*); Northern Chin Hills (*Watson*, specimens Brit. Mus.).

This form resembles *G. capitium* in colouring and marking and appears to be distinguished purely by its rounded periphery. Its claim to varietal rank is even questionable, since connecting links occur. Blanford collected at Puppa Hill an intermediate form between the carinate stage and typical *hariola,* while von Martens states that Nötling brought home from Pyinthia, a place 28 miles from Mandalay, three specimens, one of which was distinctly keeled, the second angulated, and the third with completely rounded periphery. Godwin-Austen in his paper on Spratt's shells states that two specimens were collected, one like the type and the other keeled, which he called var. *carinata* of W. T. Blanford's collection. I am not aware that Blanford ever published this varietal name and it may be assumed that this form is typical *capitium.* Nevill in his Hand List records specimens from South India taken by Stoliczka. Although this naturalist was admittedly careful I cannot help thinking that some error must have crept in, and until confirmed by other collectors I think it advisable to discard this record.

170. **Ganesella galea**, *Benson.*

Helix galea, Benson, A. M. N. H. ser. 3, iii, 1859, p. 388; Hanley & Theobald, Conch. Ind. 1870, pl. 54, fig. 7.
Nanina (*Sesara*) *galea*, Nevill, Hand List, i, 1878, p. 53.
Trochomorpha (*Nigritella*) *galea*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 82.
Helix (*Patula* (*Trochomorpha*)) *galea*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 75, pl. 14, fig. 4.
Ganesella galea, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 170.

Original description:—"Testa vix perforata, conica, trochiformi, oblique striatula, striis confertissimis spiralibus granulosis decussata, albida (decorticata); spira regulariter conica, apice acutiusculo, sutura impressiuscula, submargiuata; anfractibus 7, superioribus convexiusculis, tum planulatis, ultimo non descendente, acute carinato, subtus planulato, prope carinam leviter excavato; apertura valde obliqua, trausversa, anguste angulari-lunata, peristomatis margine superiori recto, basali arcuato, intus iucrassato, columellari superne reflexiusculo perforationem subtegente."

"Diam. maj. vix 9, min. 8, axis $5\frac{1}{2}$ mill." (*Benson.*)

Hab. Iudia: Teria Ghat (*Theobald*); Naga and Khasi Hills (*Godwin-Austen*, *W. Roberts*).

The systematic position of this species is somewhat uncertain. Nevill referred it to *Sesara*, a genus with which it does not seem to have any affinity. Pfeiffer aud Clessiu included it in *Trochomorpha*, which appears equally wide of the mark. Professor Pilsbry, with his usual acumeu, in placing it in *Ganesella*, has shown a truer appreciation of its relationship as far as shell-characters enable us to judge. Nevertheless the microscopic, but distinctly strong, decussation of the upper side is somewhat abnormal in the genus, but until an examination of the animal shall prove the contrary I consider it advisable to retain the species in *Ganesella*. The only specimeu I have seen is in the Theobald collection and agrees well with Beusou's description, except that the last whorl is shortly and abruptly deflected in front. Like the type this shell is much decorticated, aud it is probably one of the original lot.

Subfamily HELICINÆ

Genus **EULOTA**, *Hartmann.*

Eulota, Hartmann, Erd- und Süssw. Gastr. Schweiz, 1842, p. 179; Möllendorff, Nachr. Blatt D. Malak. Ges. xxiv, 1892, p. 87; Pilsbry, Man. Conch. ser. 2, ix, 1895, pp. 200, 202, pl. 65, figs. 1–6, pl. 66, figs. 18–24 (anatomy).

Type, *Helix fruticum*, Müller.

Range. Asia. Central Europe (one species).

"Shell globose-conoid or globose-depressed, umbilicated, rather

thin, the surface smoothish, generally with minute spiral striæ; colour varying from sub-translucent white to light brown or yellowish, often with a supra-peripheral band (rarely several bands). Whorls 5–6, convex, the last hardly descending in front. Aperture round-lunate, toothless; peristome thickened within and expanded, dilated at columellar insertion.

"Jaw arched, with 4–11 ribs denticulating the concave margin.

"Radula of *E. fruticum* having the median cusp of middle teeth as long as basal plate, side cusps subobsolete. Laterals with longer mesocones. Marginals with long bifid inner and on the outer ones bifid outer cusps.

"Genitalia: penis short, swollen, passing into a long epiphallus which receives vas deferens and retractor, but *lacks flagellum.* Dart sack globose, containing a round, conical dart, and communicating at base with an empty accessory sack which bears the mucus glands; these consist of 2–4 oval glands, closely bound together, and flattened on their adjacent sides, their ducts uniting into one canal which opens into the accessory sack. Duct of spermatheca long, inserted high on vagina.

"*Eulota* is here used for a considerable number of oriental snails having essentially the organisation of the European *E. fruticum.* The penis lacks flagellum; the dart sack generally bears an accessory empty sack into which the many- or few-lobed mucus gland empties; and the dart is round in section or but little flattened, the shell being globose with conoidal, though low, spire." (*Pilsbry.*)

171. **Eulota bolus,** *Benson.*

Helix bolus, Benson, A. M. N. H. (2) xviii, 1856, p. 252; Theobald, J. A. S. B. xxvi, 1857, p. 242; Blanford, op. cit. xxxiv, 1865, p. 89; Hanley & Theobald, Conch. Ind. 1870, pl. 53, fig. 7.
Helix (*Dorcasia*) *bolus,* von Martens, Die Heliceen, ed. 2, 1860, p. 107; Nevill, J. A. S. B. xlvi, 1877, p. 22; ibid. in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 881; Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 327; Tryon, Man. Conch. ser. 2, iii, 1887, pl. 48, fig. 77.
Helix (*Planispira*) *bolus,* Nevill, Hand List, i, 1878, p. 80.

Original description:—"Testa anguste umbilicata, globosa, tenuis, oblique striatula, striis minutissimis confertissimis spiralibus sub lente sculpta, nitidula, translucens, pallide cornea, interdum fascia unica rufa supra peripheriam ornata; spira conoidea, apice obtusiuscula; sutura leviter impressa; anfr. 5 convexiusculi, ultimus non descendens, inflatus; apertura vix obliqua, rotundato-lunaris; peristomate tenue, expansiusculum, albidum, margine columellari latiore, superne umbilicum semitegente.

"Diam. maj. 14–15½, min. 12–14, alt. 10½–11½ mill. Apert. majoris 9 mill. longa, 8 lata." (*Benson.*)

Hab. Burma: Prome (*Theobald, Fea*), Thyet Myo (*Stoliczka*), Pagan (*Anderson*). China: Ponsee and Sanda, Yunnan (*Anderson*).

172. **Eulota cestus**, *Benson.*

Helix cestus, Benson, J. A. S. B. v, 1836, p. 353; ibid., A. M. N. H. ser. 2, ii, 1848, p. 162; Reeve, Conch. Icon. vii, 1852, pl. 125, fig. 751; Pfeiffer, Conch.-Cab., *Helix*, i, 1853, p. 339, pl. 60, figs. 19, 20; Mabille & Lemesle, Journ. Conchyl. 1866, p. 127; Hanley & Theobald, Conch. Ind. 1870, pl. 29, fig. 7.
Helix (*Dorcasia*) *cestus*, von Martens, Die Heliceen, ed. 2, 1860, p. 107.
Helix (*Trachea*) *cestus*, Godwin-Austen, J. A. S. B. xlv, 1876, p. 312.
Helix (*Planispira*) *cestus*, Nevill, Hand List, i, 1878, p. 80.
Helix (*Helicella* (*Dorcasia*)) *cestus*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 206, pl. 47, figs. 31, 32.
Eulota (s. s.) *cestus*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 204.

Original description, amended:—"Testa perforata, subdepresso-conoidea, fuscescente-cornea, subplicato-striata, supra angulum castaneo-unizonata; spira subconoidea, apice obtusato; anfractibus 5, leviter convexis, supra planulata, ultimi peripheria angulata, basi convexiuscula; apertura obliqua, depressa, minime transversa (altitudine latitudinem æquante), rotundato-lunari, superne labro-antrorsum arcuato, expansiusculo, margine columellari basalique reflexis illo dilatato, perforationem semitegente.

"The greater narrowness of the perforation which is nearly concealed by the reflected columellar lip, the more obtuse apex, more planulate whorls, less convex base, the oblique, sinuous, and less transverse depressed aperture and the more angular periphery, serve, independently of colour, to distinguish *H. cestus* from any of the varieties of *H. similaris*." (*Benson* 1848.)

Major diam. 13·25–16·5, min. 11·5–15·25 mm.; alt. 8·75–12 mm.

Hab. India: Sylhet, Assam (*Mainwaring*, my collection); Durrang Plains, Dafla Hills, Assam (*Godwin-Austen*). Cambodia: Moth-Kasa (*Mabille & Lemesle*).

Pfeiffer originally considered *H. cestus* to be synonymous with *H. similaris* (Mon. Helic. Viv. i, 1848, p. 336), but subsequently modified his opinion, stating that he had been misled by specimens received under that name from China and which proved to pertain to *H. similaris* (*op. cit.* iii, 1853, p. 228). Tryon also thought it was perhaps only a variety of that species. *Eulota cestus* appears to me quite distinct, however, as it can readily be separated from the numerous forms of *E. similaris* by several characters, as pointed out by Benson in his amended description. The species, in fact, rather resembles *Planispira shanica* in shape and contour, but it is not plicate, the umbilicus is narrower, the peristome more expanded and the columellar lip more reflected.

173. **Eulota similaris**, *Férussac.*

Helix (*Helicella*) *similaris*, Férussac, Tabl. Syst. Limaçons, 1822, no. 262 (+ α *unicolor*, β *zonulata*) (nom. nud.).

Helix (*Helicogena*) *similaris*, Férussac, Hist. Nat. Moll. livr. xv, 1822, pl. 25 B, fig. 1 (var. *a*), fig. 4 (var. *β*), livr. xxiii, 1832, pl. 27 A, figs. 1–3 (var.).
Helix similaris, Deshayes in Férussac, Hist. Nat. Moll. i, 1850, p. 171; Blanford, J. A. S. B. xxxiv, 1865, p. 88; Hanley & Theobald, Conch. Ind. 1870, pl. 53, fig. 1.
Helix (*Fruticicola*) *similaris*, Albers, Die Heliceen, 1850, p. 70; Collett, J. A. S. B. Ceylon Branch, xv, 1904, p. 12.
Helix (*Dorcasia*) *similaris*, von Martens, Die Heliceen, ed. 2, 1860, p. 107; Nevill in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 880; Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 326.
Helix (*Planispira*) *similaris*, Nevill, Hand List, i, 1878, p. 79.
Helix (*Fruticicola* (*Dorcasia*)) *similaris*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 205, pl. 46, figs. 27–30.
Fruticicola similaris, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 285.
Eulota (s. s.) *similaris*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 205.
Helix (*Helicogena*) *addita*, Férussac, Tabl. Syst. Limaçons, 1822, p. 71 (67), no. 38 bis; ibid., Hist. Nat. Moll. livr. xv, 1822, pl. 25 B, figs. 2, 3.
Helix translucens, King, Zool. Journ. v, 1830, p. 339.
Helix woodiana, Lea, Trans. Philos. Soc. Philadelphia, v, 1837, p. 57, pl. 19, fig. 69.
Helix epixantha, Pfeiffer, Zeits. Malak. vii, 1850, p. 70; ibid., Conch.-Cab., *Helix*, iii, 1854, p. 349, pl. 134, figs. 13–15.

Original description:—" H. testa subdepresso-globosa, minute striata, diaphana, pallide cornea, unicolore vel rufo-unizonata; spira magis minusve elata; anfractibus convexiusculis, ultimo basi convexo, perforata; apertura rotundato-lunari; peristomate albo, reflexo, margine columellari subdilatato.

" Diam. maj. 16, min. 14, alt. 12 mm." (*Deshayes*).

Hab. India: Bengal (*Reeve*). Burma: Prome, Pagan, and Bahmo Sanda (*Anderson*); Beeling (*Stoliczka*); Thyet Myo (*Tapparone*). Ceylon: Nawalapitiya (*Simon*); Ambagamuwa (*Collett*).

No other land mollusc has so wide a geographic range as *Eulota similaris.* It is probably indigenous in Central and Southern China, Burma, Cochin China, Siam, the Malay Peninsula and Singapore, Java, Celebes, Timor, and the Philippine Islands, but, " by the unconscious intervention of commerce it has become colonized," as Prof. Pilsbry remarks, in Japan, Formosa, Hongkong; Bengal; Ascension, Rodriguez, Reunion (Bourbon), Mauritius, the Seychelles, the Comoros, Madagascar, and Natal; New South Wales; the Sandwich Islands; Bermuda, Cuba, and Barbados; Brazil and Argentina. Deshayes was, I believe, the first to draw attention to its wide distribution when he questioned if there was another instance of a terrestrial mollusc occurring in so many remote habitats, adding that it would be of great interest to examine the animals from the various localities, so as to make sure that they belonged to the same species. It has long been considered that it owed its wide

range to its having been distributed with coffee plants, but this theory has recently been called in question. Prof. Pilsbry thinks that it has followed the cultivation of sugar-cane, and this appears to be a rather plausible theory, seeing that in many places it is commonly found on the borders of cane-fields.

The bibliography of *Eulota similaris* is very voluminous and I have confined myself to the essential portion of it with reference to the geographical limits of this work. A number of varieties have been established, but these have also been disregarded as they likewise are outside the scope of the Fauna of British India. Deshayes included under the synonymy of *similaris*, *Helix cestus*, Benson, but in this I do not consider he was justified, since the latter appears to me quite distinct, as already stated when dealing with that species.

174. Eulota extrusa, *Tapparone*.

Helix similaris, var., Hanley & Theobald, Conch. Ind. 1870, pl. 53, fig. 2.
Helix (*Dorcasia*) *extrusa*, Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 326.
Helix (*Eulota*) *extrusa*, Pilsbry, Man. Conch. ser. 2, viii, 1893, p. 218, pl. 54, fig. 100.
Eulota (s. s.) *extrusa*, Pilsbry, op. cit. ix, 1895, p. 204.

Original description :—" H. testa anguste umbilicata, subglobosa, corneo-alba, pellucida, per longitudinem oblique striata, lineis tenuissimis appressis sub lente conspicuis, basi precipue spiraliter exarata; spira conoidea, parum elevata, apice obtusiusculo. Anfractibus 5, regulariter accrescentes, convexiusculi, sutura impressa, subirregulari sejuncti; ultimus magnus, subglobosus, antice vix descendens, ad peripheriam interdum perobscure subangulatus. Apertura rotundato-lunata, parum obliqua; peristoma simplex, acutum, basi subreflexum, marginibus remotis; columellari dilatato, reflexo, umbilici mediam partem obtegente.

" Diam. maj. 15, min. 13; alt. 10 a 11 mill." (*Tapparone*.)

Hab. Burma: Katha, Upper Irrawaddy (*Fea*).

175. Eulota zoroaster, *Theobald*.

Helix zoroaster, Theobald, J. A. S. B. xxviii, 1859, p. 306; Blanford, op. cit. xxxiv, 1865, p. 88; Hanley & Theobald, Conch. Ind. 1874, pl. 86, figs. 2, 3 (var. *concolor*).
Helix (*Dorcasia*) *zoroaster*, Nevill in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 881.
Helix (*Planispira*) *zoroaster*, Nevill, Hand List, i, 1878, p. 79.
Helix (*Helicella* (*Dorcasia*)) *zoroaster*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 211, pl. 48, fig. 93.
Eulota (s. s.) *zoroaster*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 205.

Original description :—" Testa umbilicata, depresso-globosa, minute striata, cornea, ad peripheriam rufo unifasciata (interdum

non cincta, pallide cornea sive vitrea). Anfract. 5. Apertura parum obliqua, rotundato lunari. Perist. tenui, reflexiusculo.

"Diam. 0·62 [=16 mm.]; alt. 0·34 [=9 mm.]." (*Theobald.*)

Hab. Burma: Banks of Irrawaddy, between Ava and Prome (*Theobald*); Prome, Thyet Myo, Tsagain, Pagan, Manwyne (*Anderson, Blanford*).

176. Eulota schanorum, *Möllendorff.*

Eulota schanorum, Möllendorff, Nachr. Blatt D. Malak. Ges. xxxi, 1899, p. 165.

Original description:—"T. anguste et semiobtecte umbilicata, conoideo-globosa aut globoso-conoidea, solidula, leviter striata, spiraliter minute lineata, pallide luteo-cornea. Spira plus minusve conoidea. Anfr. $5\frac{1}{2}$–6 modice convexi, ultimus supra medium obtuse subangulatus, antice breviter descendens, circa umbilicum sat distincte angulatus. Apertura modice obliqua, subcircularis, sat excisa, peristoma modice expansum, intus sublabiatum, margo columellaris superne valde dilatatus, umbilicum medium obtegens.

"Diam. 24·5, alt. 18, apert. lat. 15, long. 13·5, alt. 12 mm.
" „ 21·5, „ 23, „ „ 13·5, „ 12, „ 10·25 mm."
(*Möllendorff*).

Hab. Burma: Shan States (*Hungerford*); Kalow, S. Shan States (*Strubell*).

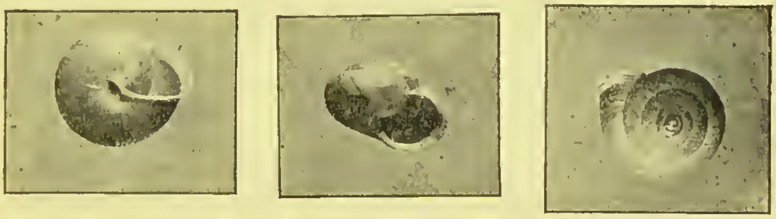

Fig. 82.—*Eulota schanorum.*

I have not seen the species but Dr. Fritz Haas of Frankfurt a/M. has been good enough to supply me with photographs of the type, in the Senckenbergisches Museum, from which the accompanying illustrations have been reproduced.

177. Eulota scalpturita, *Benson.*

Helix scalpturita (Benson), Theobald, J. A. S. B. xxvi, 1857, p. 248 (nom. nud.); Benson, A. M. N. H. ser. 3, iii, 1859, p. 391; Blanford, J. A. S. B. xxxiv, 1865, p. 88; Hanley & Theobald, Conch. Ind. 1870, pl. 53, fig. 9.

Helix (*Planispira*) *sculpturita,* Nevill, Hand List, i, 1878, p. 79 Godwin-Austen, P. Z. S. 1888, p. 242.

Helix (*Acusta* (*Fruticicola*)) *scalpturita*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 119.
Helix (*Helicella* (*Dorcasia*)) *scalpturita*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 211, pl. 48, fig. 94.
Helix (*Dorcasia*) *scalpturita*, Nevill in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 881; Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 51.
Eulota (s. s.) *scalpturita*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 205.

Original description :—"Testa umbilicata, globoso-depressa, striatula, confertim spiraliter acuducto-striata, nitidiuscula, albida, versus apicem et antice pallide rufescente, aliquando unifasciata; spira conoidea, apice obtuso, sutura impressa; anfractibus 5½ sensim accrescentibus, convexiusculis, ultimo rotundato, antice parum breviter desceudente; apertura obliqua, rotundato-lunata, peristomate teuui, expansiusculo, margiue columellari dilatato-expauso, umbilicum augustum profundum partim celante."

"Diam. maj. 22, min. 19, axis 14 mill."

"Var. depressior: Diam. maj. 20½, min. 18, axis 11 mill." (*Benson.*)

Hab. Burma: Ava (*Oldham*); Tsagain, Ava, aud Mandalay (*Blanford, Anderson*); Mandalay (*Fea*); Shan Hills (*Godwin-Austen*); Thyet Myo or Prome (*Theobald*).

Benson, in describing the species, states that "independently of size, colour and greater solidity, there would be little to distinguish this shell from the true *H. similaris*, Fér., were it not for its peculiar sculpture." The comparison, to my mind, is not a happy one as *scalpturita*, apart from its sculpture, has a totally different contour. Beuson also refers to a still more-depressed, and smaller, variety than that of which the measurement is given, found by Mr. Theobald at Thyet Myo or Prome, but he gives no dimensions. I possess some specimens from Ava which measure: diam. maj. 18·5, min. 16·5, axis 10 mm. On the other haud, the British Museum contains specimens, from the Upper Irrawaddy, measuring:—28 : 24 : 22 mm., and some shells from Pegu without the peripheral band.

178. Eulota pilidion, *Benson.*

Helix pilidion, Benson, A. M. N. H. ser. 3, vi, 1860, p. 191; Hanley & Theobald, Conch. Ind. 1870, pl. 53, fig. 6.
Helix (*Planispira*) *pilidion*, Nevill, Hand List, i, 1878, p. 80.
Helix (*Camaena*) *pilidion*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 191; Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 326 (*piliodon*).
Helix (*Euhadra*) *pilidion*, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 114, pl. 31, fig. 20.
Eulota (s. s.) *pilidion*, Pilsbry, op. cit. ix, 1895, p. 204.

Original description :—"Testa anguste umbilicata, subgloboso-conoidea, tenuissima, lævigata, leviter striatula, striis remotiusculis elevatioribus corneo-fuscis, alteris confertissimis spiralibus decussantibus, translucente, albida, fascia unica peripherica rufa

ornata; spira conoidea, apice obtusiusculo, sutura leviter impressa; anfractibus 4½, sensim accrescentibus, convexiusculis, ultimo antice vix descendente, subtus convexo; apertura obliqua, quadrato-lunata; peristomate acuto, tenui, undique expansiusculo, marginibus remotis, subconniventibus, callo tenui junctis, columellari latiore triangulato-expanso."

"Diam. maj. 16, min. 13, axis 9 mill." (*Benson.*)

Hab. Burma: Pegu (*Benson*); East of Moulmain (*Stoliczka*); Tenasserim (*Davison*); Bhamo (*Fea*). Cambodia (*Morelet*).

This appears to be a rare species. I have not seen specimens. Some shells in the Theobald collection, British Museum, were labelled *H. pilidion*, but upon examination they proved to be *Ganesella scenoma*.

179. **Eulota peguensis**, *Benson.*

Helix peguensis, Benson, A. M. N. H. ser. 3, vi, 1860, p. 192; Blanford, J. A. S. B. xxxiv, 1865, p. 89; Hanley & Theobald, Conch. Ind. 1870, pl. 58, fig. 6.
Helix (*Planispira*) *peguensis*, Nevill, Hand List, i, 1878, p. 79.
Helix (*Euhadra*) *peguensis*, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 113, pl. 31, fig. 22.
Eulota (s. s.) *peguensis*, Pilsbry, op. cit. ix, 1895, p. 204.

Original description:—"Testa anguste umbilicata, globoso-depressa, solidiuscula, oblique rugoso-striatula, nitidiuscula, translucente, rufocornea, obscure unifasciata; spira conoidea, apice obtuso, sutura profundiuscula, rugose submarginata; anfractibus 5, vix convexis, lente accrescentibus, ultimo rotundato, supra peripheriam obtuse angulato, antice leviter descendente, circa umbilicum compressiusculo; apertura obliqua, rotundato-lunari, peristomate expansiusculo, livide albido-violaceo, marginibus remotis subconniventibus, columellari expanso, reflexiusculo, umbilicum leviter occultante.

"Diam. maj. 20, min. 18, axis 13 mill." (*Benson.*)

Hab. Burma: Sheoay-Gheen, Pegu (*Haughton*), Thyet Myo, Pegu (*Theobald*).

"The umbilicus is wider in some specimens than in others, and the angle above the periphery is variable, and occasionally more pronounced. In dead specimens the livid violaceous colour of the aperture and lip is changed into white, and the obscure fuscous band at the periphery is scarcely to be detected." (*Benson.*)

180. **Eulota radicicola**, *Benson.*

Helix radicicola, Benson, A. M. N. H. ser. 2, ii, 1848, p. 161; Reeve, Conch. Icon. vii, 1852, pl. 125, fig. 753; Pfeiffer, Conch.-Cab., *Helix*, iii, 1854, p. 379, pl. 141, figs. 13, 14; Hanley & Theobald, Conch. Ind. 1874, pl. 62, fig. 10.
Helix (*Helicella* (*Dorcasia*)) *radicicola*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 210, pl. 48, fig. 85.
Eulota (s. s.) *radicicola*, Pilsbry, Man. Conch. ser. 2, ix, 1905, p. 205.

Original description:—"Testa perforata, subglobosa, tenui, virescente-cornea, translucente, subtus nitidiori, radiato-striata, striis concentris delicatissimis decussantibus; spira elata conoidea, apice obtuso; anfractibus 4 convexis, ultimo obtuse angulato; apertura obliqua, subquadrato-rotundata; peristomate recto (acuto), margine columellari verticaliter descendente, supra late reflexo, perforationem semitegente.

"Diam. maj. 10 mm.; axis 7 mill." (*Benson.*)

Hab. India: Landour (*Bacon, Benson*); Mussoorie (*Hutton*); Simla (*Theobald*); Sikkim (*Beddome*).

The Benson collection at Cambridge contains a tablet with six specimens, the largest of which measures: diam. 11·5, alt. 10·75 mm., the smaller ones being immature. No locality is recorded ou the tablet and it is rather doubtful whether the type is one of them. A specimen in the Theobald collection of the British Museum, from Simla, is likewise not quite mature, the peristome not being quite developed. It measures: 11 : 9 : 11 mm.

Var. elatior, *Martens*.

Helix (*Arionta*) *elatior*, von Martens, Malak. Blätt. xv, 1868, p. 157.

Helix elatior, Pfeiffer, Novit. Conch. ser. 1, iii, 1869, p. 461, pl. 101, figs. 4–6.

Helix (*Planispira*) *radicicola*, Hutton, Nevill, Hand List, i, 1878, p. 78 (=*H. elatior*, Martens).

Helix (*Fruticicola* (*Dorcasia*)) *elatior*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 210, pl. 52, figs. 14–15.

Eulota (s. s.) *elatior*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 204.

Original description:—"Testa subobtecte perforata, globoso-conica, striatula et malleata, nitidula, pallide viridi-flavida fascies 2 pallide fuscis latis picta; spira elevata, conica acutiuscula; anfr. 5, convexiuscula, ultimus rotundatus, antice paulum descendens; columella recta, crassa; apertura diagonalis, truncato-ovalis; peristoma incrassatum, breviter patulum album, margine columellari paulum arcuato, supra dilatato, perforationem maxima e parte tegente.

"Diam. maj. 15½, min. 13, alt. 15; apert. lat.=alt., 8½ mill." (*von Martens.*)

Hab. Himalaya.

Dr. Thiele, the Director of the Königl.-Zool. Museum, Berlin, has obligingly sent me the type of von Marten's *Helix elatior* for inspection, and a careful examination has convinced me that it can at the most be ouly regarded as a variety of *E. radicicola*. It is certainly a larger and more solid shell than typical *radicicola*, the peristome is distinctly thickened and expanded, but scarcely reflexed, while the columellar margin is broadly dilated and reflexed, almost completely closing the umbilicus, a mere slit being left, scarcely large enough to admit a very fine needle. On some of the whorls very minute spirals can be detected with a

strong lens, while the last quarter of the penultimate and the whole of the last whorl is more or less regularly malleated, giving the appearance here and there of being furnished with spiral or obliquely descending ridges. The shell, moreover, is ornamented with two pale fuscous bands, one comparatively narrow, midway between the suture and periphery, the other practically covering the base of the shell from the periphery downwards, but becoming rather diffused about the umbilicus.

A specimen from Sikkim, in the Beddome collection, agrees fairly well with *elatior*, but it is without the bands and is subangulated at the periphery except towards the mouth. It is also a trifle broader in proportion, measuring 16·5 mm. in diameter, alt. 15 mm.

Genus **CATHAICA**, *Möllendorff.*

Cathaica, Möllendorff, Jahrb. D. Malak. Ges. xi, 1884, p. 339 (as group of *Helix*); Pilsbry, Man. Conch. ser. 2, viii, 1893, p. 204 (as section of *Helix*), ix, 1895, p. 205 (as section of *Eulota*); Andreae, Mitt. Roemer Mus., no. 12, 1900, p. 2; Möllendorff, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersburg, iv, 1899, p. 101; ibid., op. cit., vi (1901), 1902, p. 302.

TYPE, *Helix fasciola*, Drap. (=*pyrrhozona*, Phil.).

Range. North and Middle China, Central Asia, Kashmir and Burma.

"Testa umbilicata, depressa, striis vel costis ruditer sculpta, anfr. 5–7, convexiusculi, ultimus plerumque ad peripheriam angulatus vel carinatus, apertura obliqua, peristoma intus incrassatum margine supero plerumque recto, externo et infero plus minusve expansis, columellari dilatato." (*Möllendorff.*)

"Animal with the tail rounded above, no longitudinal groove. Sole indistinctly tripartite.

"Jaw arcuate, with 3 to 7 weak ribs.

"Radula with blunt mesocones on median and lateral teeth; marginals with the ectocone simple or bifid.

"Genitalia: penis slender, ending in a long retractor and the terminal vas deferens. Dart sack large, opening into atrium, one dense cluster of about 10 club-shaped, glandular mucus glands inserted near its base. Spermatheca duct long." (*Pilsbry.*)

Subgenus **CAMPYLOCATHAICA**, *Andreae.*

Campylocathaica, Andreæ, Mitt. Roemer Mus. no. 12, 1900, p. 5; Möllendorff, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersburg, vi (1901), 1902, p. 306.

TYPE, *Helix przewalskii*, von Martens.

Range. Central Asia and Burma.

Shell less solid than in the subgenera *Eucathaica* and

Pliocathaica, frequently with translucent patches or dappled with brown. Aperture more oblique than in *Eucathaica*, the reflexed margin less thickened within, the tooth, characteristic of *Cathaica*, but faintly indicated, generally only present in the smaller forms. The last whorl shows an indication of an angulation at the upper portion. Frequently two brown bands are present, which occasionally are partly dissolved or interrupted. (*Andreae.*)

181. Cathaica mataianensis, *Nevill.*

Helix (*Fruticicola*) *mataianensis*, Nevill, Scient. Res. Second Yarkand Mission, 1878, p. 3, figs. 7–9.
Helix (*Trachia*) *mataianensis*, von Martens, Mém. Acad. Imp. Sci. St. Petersburg, ser. 7, xxx, no. 11, 1882, p. 49.
Helix (*Plectotropis* (*Pseudiberus*)) *mataiensis* (err. typ.), Tryon, Man. Conch. ser. 2, iv, 1888, p. 89, pl. 12, figs. 6–8.
Eulota (*Pseudiberus*) *mataianensis*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 207.
Cathaica (*Pseudiberus*) *mataianensis*, Andreae, Mitt. Roemer Mus. no. 12, 1900, p. 5.
Cathaica (*Campylocathaica*) *mataianensis*, Möllendorff, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersburg, vi (1901), 1902, p. 306.

Original description:—" Shell a little smaller than *H. plectotropis*, in many respects a good deal resembling it, but of much thinner and more delicate texture; openly umbilicate, depressedly conoidal; whorls five and a half, with excavated suture and without a raised keel, in both of which respects it materially differs from the preceding [*H. plectotropis*], last whorls with a medium-sized keel, base convex, above sculptured irregularly, with more or less strongly developed ribs, beneath sculpture obsolete, almost smooth; white, irregularly mottled with pale horn colour, apex horn brown; aperture ovate, subangulate at periphery, almost as high as broad; peristome lightly reflexed, columella expanded.

" Diam. 13·5, alt. 7 mm.; apert. diam. 6·75, alt. 6·75 mm.

Hab. Kashmir: Mataian, Dras Valley, at 11,200 ft.

" Unfortunately most are quite young shells, only one or two being sufficiently full grown to show the reflexed outer lip. Stoliczka describes the animal in his journal as 'uniform greenish dusky, no trace of a tail gland, the body very short, the posterior part of the foot shorter than the anterior.' " (*Nevill.*)

182. Cathaica phæozona, *von Martens.*

Helix phaeozona, von Martens, Imp. Obsh. Lyubi. Estest. Antrop. Etnoghr. xi, part 1, 1874, p. 13, pl. 1, fig. 8 (shell), pl. 3, fig. 39 (radula).
Helix (*Fruticicola*) *phæozona*, Nevill, Sci. Res. Second Yarkand Mission, 1878, p. 2, figs. 1-3; ibid., Hand List, i, 1878, p. 92; von Martens, Mém. Acad. Imp. Sci. St. Petersburg, ser. 7, xxx, no. 11, 1882, p. 11, pl. 2, figs. 10, 11.

Helix (*Helicella* (*Dorcasia*)) *phæozona*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 205, pl. 46, figs. 25, 26.
Helix (*Eulota*) *phaeozona*, Kobelt, Rossmässler's Iconogr., Neue Folge, vi, 1893, p. 75, pl. 169, fig. 1087.
Eulota (*Eulota*) *phæozona*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 204.
Helicella (*Theba*) *phæozona*, ibid., op. cit. 1895, p. 266.
Cathaica phæozona, Möllendorff, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersburg, iv, 1899, p. 126.
Helix phæozona, Wiegmann, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersburg, v, 1900, p. 131 (anatomy).

Original description :—" Testa anguste umbilicata, conoidea, semiglobosa, ruditer striata, lineis spiralibus subtilissimis confertis, alba, fascia unica latiuscula, castanea, peripherica ; spira conoidea; anfractus 5½, convexiusculi, ultimus basi convexus, antice vix descendens ; apertura parum obliqua, lunato-rotundata ; peristoma leviter incrassatum, margine supero recto, basali patulo, columellari dilatato patente." (*Martens.*)

Diam. maj. 14–17, min. 11·5–14·5, alt. 8–14·5, apert. lat. 7–8·5, alt. 6·5–7 mm.

Hab. Turkistan (*Fedtschenko*, *Przewalski*, *Stoliczka*). India : Hunza, Kashmir (*Conway*).

Five specimens—of which only two are adult—collected at Hunza, Kashmir, and presented to the British Museum in 1893 by Mr. W. M. Conway, I refer to von Martens's species. They are smaller and more depressed than the shells figured by von Martens and Nevill, measuring 14 : 11·5 : 8·5 mm. respectively, but both authors state that the species varies considerably in this respect, the latter recording a depressed variety from Pasrobat, west of Yarkand, measuring : diam. 16, alt. 14·5 mm.

183. Cathaica bactriana, *Hutton.*

Var. burmanica, *var. nov.*

Helix bactriana, Hutton, J. A. S. B. xviii, 1849, p. 651 ; Reeve, Conch. Icon. vii, 1854, pl. 195, fig. 1376 ; Hanley & Theobald, Conch. Ind. 1875, pl. 130, figs. 1, 4.
Helix (*Fruticicola*) *bactriana*, Nevill, Hand List, i, 1878, p. 93.
Helix (*Helicella* (*Dorcasia*)) *bactriana*, Tryon, Man. Conch. ser. 2, iii, 1887, p. 212, pl. 49, figs. 13, 14.
Eulota (*Eulota*) *bactriana*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 204.

Original description:—"Animal straw coloured, with the superior tentacula very long and black ; shell carried obliquely horizontal ; foot short and rather tapering posteriorly.

"Shell fuscous or pale earthy brown, but varying to reddish brown, and in some to sandy brown ; in living specimens dotted over with darker spots or blotches from the animal being apparent through it ; subglobose ; spire obtuse, scarcely exserted ; whorls 6 ; aperture ovate-lunate, oblique; whorls obliquely and finely wrinkled

with the striæ of growth; peristome acute, pillar lip partially reflected over the umbilicus; a strong white rib within the aperture, showing usually a rufous band externally, umbilicus moderate, exposing a portion of the penultimate whorl. Some have a pale line along the periphery of the body whorl, which is slightly angular.

"Diameter $\frac{6}{10}$ inch [=15 mm.]." (*Hutton.*)

Hab. Afghanistan, Candahar (*Hutton*), type. Burma (*Cuming Coll.*), var.

The var. *burmanica* differs from the type in being more depressed, more widely umbilicated, in having the periphery subangulated and the basal margin of the peristome nearly straight and obliquely ascending towards the columellar margin. The specimen in the Cuming collection of the British Museum, upon which this new variety is based, is also considerably paler than the type, but, notwithstanding, shows the peripheral pale band distinctly.

Genus PLECTOTROPIS, *Martens.*

Thea, Albers, Die Heliceen, 1850, p. 118 (not *Thea*, Coleoptera, Mulsant, 1846).

Plectotropis, von Martens, Die Heliceen, ed. 2, 1860, p. 121, as section of *Helix*; Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 208, as section of *Eulota*, pl. 65, figs. 13, 14, pl. 66, figs. 33, 34 (anatomy).

Type, *Helix elegantissima*, Pfeiffer.

Range. India, Burma, Farther India, Japan, China and adjacent Islands, south to the Malay Archipelago.

"Shell depressed and carinated, widely umbilicated, dull and brown, with more or less shaggy cuticle and usually a peripheral fringe of hairs; whorls numerous (5 to 8), narrow and slowly increasing. Aperture small, angulate-lunar, oblique; lip narrowly expanded, reflexed below.

"Jaw high-arched, with many (10–19) ribs, more or less denticulating the basal margin.

"Radula having the middle tooth without side cusps, but with a lateral bulging, middle cusps about the length of basal plate; laterals with a small ectocone. Marginals with the long inner cusp bifid, ectocone split into two.

"Genitalia; penis rather long, epiphallus short, strongly bent at the attachment of retractor, continued in a rather short, blunt flagellum. Dart sack large, containing a long, slightly curved dart, lens-shaped in section. Mucus gland inserted high on dart sack, divided into two glandular branches which are wide, flattened and rather incoherent, the dart sack and glands bound loosely to vagina. Duct of spermatheca very long and slender, without diverticulum, bound to oviduct." (*Pilsbry.*)

The species constituting the group of *Plectotropis* appear to me so well characterized conchologically that it is here accorded

generic rank. Without in any way presuming to criticise Prof. Pilsbry's views, the conchological characters seem to be correlated with certain anatomical details. In *Plectotropis* a flagellum occurs which is wanting in *Eulota* s.s. In the former the epiphallus is long and the duct of the spermatheca is bound to the oviduct, in the latter it is inserted high on the vagina and the epiphallus is short. In *Plectotropis* the jaw possesses 10–19 ribs, in *Eulota* it is provided with only 4–11 ribs.

184. **Plectotropis huttoni**, *Pfeiffer.*

Helix orbicula, Hutton, J. A. S. B. vii, 1838, p. 271 (non *H. orbicula*, Orbigny, 1835).
Helix huttoni, Pfeiffer, Symb. Hist. Helic. ii, 1842, p. 82; ibid., Mon. Helic. Viv. i, 1848, p. 202; Reeve, Conch. Icon. vii, 1852, pl. 129, fig. 786; Blanford, J. A. S. B. xxxiv, 1865, p. 89; Hanley & Theobald, Conch. Ind. 1870, pl. 15, fig. 8; Theobald, J. A. S. B., xxxix, 1870, p. 395; Pfeiffer, Conch.-Cab., *Helix*, iii, 1881, p. 399, pl. 144, figs. 9, 10.
Fruticicola huttoni, Theobald, J. A. S. B. xlvii, 1878, p. 144.
Helix (Plectotropis) huttoni, Nevill, Hand List, i, 1878, p. 73; Tryon, Man. Conch. ser. 2, iv, 1888, p. 54, pl. 11, fig. 56.
Eulota (Plectotropis) huttoni, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 209.

"T. umbilicata, orbiculato-convexiuscula, subdiaphana, pallide-cornea, epidermide scabra induta; anfr. 6 convexiusculi, ultimus angulatus, antice vix descendens; umbilicus latiusculus, perspectivus; apertura obliqua, lunato-rotundata; perist. simplex, marginibus conniventibus, dextro recto, basali breviter reflexo, columellari subdilatato, patente." (*Pfeiffer.*)

"Diam. maj. 10, min. 9, alt. 5½ mill."

Hab. India: Simla and Landour (*Hutton, Stoliczka, Oldham*); Darjeeling (*Stoliczka, Mainwaring*); Kashmir (*Theobald*); Naga Hills (*Roberts*); Dafla Hills (*Godwin-Austen*); Shevroy Hills, (*my collection*). Burma: Upper Salween Valley (*Fedden*); Puppa Hills, near Ava (*Blanford*). China: Ponsee, Yunnan (*Anderson*).

Var. **savadiensis**, *Nevill.*

Helix (Plectotropis) huttoni, var. *savadiensis*, Nevill, J. A. S. B. xlvi, 1877, p. 20; ibid., Hand List, i, 1878, p. 73; ibid. in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 879.

Diam. 12·5, axis 5·25 mm.

Hab. Upper Burma: Sawady (*Anderson*).

Differs from the type by its more raised spire, stouter texture, and less open umbilicus. Nevill considers the shell represented in Conch. Ind. pl. 15, fig. 8, not to be a typical specimen from the North-West Himalayas, but rather a specimen from Darjeeling. The former, he states, is a smaller, more rounded, and less solid shell, scarcely keeled at the periphery, with a higher spire and

less produced aperture. The Darjeeling specimen measures: diam. 12·25, axis 5·25 mm. Specimens from Darjeeling in my collection measure: diam. 10·5, axis 5, but they are distinctly keeled. A form found by Dr. Anderson abundantly at Ponsee and Ava is said to be nearer the Darjeeling form; the spire being slightly higher, with the apex more central.

A variety is recorded by Nevill (Hand List, i, 1878, p. 74) from Great Cocos Island (*Stoliczka*) and Little Cocos Island (*Wood-Mason*), but no characters or dimensions are mentioned.

Var. **radleyi**, *Jousseaume*.

Hygromia radleyi, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 284, pl. 4, fig. 6.

Helix huttoni, var. *radleyi*, Sykes, Proc. Malac. Soc. London, iii, 1898, p. 161.

Diam. 9·2–11, alt. 4–6·5 mm.

Hab. Ceylon: Nuwara-Eliya (*Simon*), Uda Pussellawa (*Collett*).

Scarcely separable from typical *huttoni*, but it appears to be smaller, more elevated in the spire, and somewhat more closely coiled. I possess specimens from Uda Pussellawa, measuring: diam. 10·5, alt. 5·5 mm., being intermediate, therefore, between Jousseaume's and Sykes' specimens as regards elevation of spire. Nevill records a variety (Hand List, i, 1878, p. 73) from Fort McDonald, Ceylon, which is probably identical with Jousseaume's variety.

185. **Plectotropis oldhami**, *Benson*.

Helix oldhami (Benson), Theobald, J. A. S. B. xxvi, 1857, p. 248 (nom. nud.); Benson, A. M. N. H. ser. 3, iii, 1859, p. 185; Blanford, J. A. S. B. xxxiv, 1865, p. 89; Hanley & Theobald, Conch. Ind. 1870, pl. 15, fig. 7.

Helix (*Ægista*) *oldhami*, von Martens, Die Heliceen, ed. 2, 1860, p. 122.

Helix (*Plectotropis*) *oldhami*, Nevill, Hand List, i, 1878, p. 73; ibid., in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 878.

Helix (*Plectotropis* (*Ægista*)) *oldhami*, Tryon, Man. Conch. ser. 2, iv, 1888, p. 61, pl. 13, fig. 25.

Eulota (*Plectotropis*) *oldhami*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 209.

Original description:—"Testa late umbilicata, orbiculato-depressa, tenui, oblique irregulariter flexuoso-striata, cornea?; spira vix elevata, vel depressissime conoidea, apice exsertiusculo, obtuso, sutura impressa; anfractibus 6½ lente crescentibus, planulatis, ultimo antice breviter rapide descendente, superne obtuse carinato, subtus convexo, circa umbilicum profundum perspectivum angulato; apertura obliqua, subcirculari, peristomate expansiusculo, reflexiusculo, marginibus conniventibus, approximatis."

"Diam. major 13, minor 11, axis 6 mill." (*Benson*.)

Hab. Burma: Ava (*Oldham*, *Anderson*); between Prome and Tongoop, Arakan Hills (*Blanford*); Pegu (*Stoliczka*). India: Assam (*Stoliczka*).

When describing the species Benson referred to *H. oculus* as its nearest ally. It is, however, much nearer to *tapeina*, from which it may be distinguished by the wider and more open umbilicus, the slightly blunter periphery, more depressed spire, and more closely coiled whorls, for although considerably smaller in size it possesses a whorl more. A third specimen on the same tablet in the Benson collection, in fact, I refer to *P. tapeina*, var. *akowtongensis*; while measuring 16 mm. in diameter, it is only composed of $5\frac{1}{2}$ whorls, the last whorl is less deflected in front and a little less angulated at the periphery, although the whorls are more flattened. This variety appears to approximate still nearer to *P. oldhami*, although usually more depressed in the spire, less deflected in front, and possessing only five whorls. The latter, however, is invariably more angulated around the umbilicus than either *P. tapeina* or its variety *akowtongensis*.

The shell recorded by Blanford * as *H. oldhami* from Siam is quite distinct and belongs to *Trachia*, being nearer to *nilagerica*.

186. **Plectotropis nutans**, *Gude*.

Plectotropis nutans, Gude, Proc. Malac. Soc. London, xi, 1914, p. 55, text-figure.

Original description:—"Shell depressed conoid, rather widely and perspectively umbilicated, thin, light corneous under a pale yellowish deciduous cuticle, finely and irregularly striated, very minutely spirally striated above, the base covered with much coarser, incised, slightly wavy spirals. Spire low, suture linear, apex acute. Whorls $5\frac{1}{4}$–$5\frac{1}{2}$, increasing slowly and regularly at first, the last rather suddenly; flattened above, the last convex below, keeled at the periphery, the keel being rather pinched above and below, angulated around the umbilicus, not dilated at the mouth, very shortly and slightly descending in front. Aperture oblique, subhastate, margins approaching, united by a very thin callus on the parietal wall; peristome rather thin, scarcely thickened, but distinctly expanded, slightly reflexed; upper margin slightly curved, forming an obtuse angle with the outer margin, which is also slightly curved, the basal margin strongly curved, slightly angulated at the junction with the columellar margin, which is almost straight, ascending obliquely, triangularly dilated, but not overhanging the umbilicus." (*Gude.*)

Major diam. 16·5–17, minor 14–14·5; alt. 8 mm.

Hab. India: Habiang, Garo Hills (*Godwin-Austen*); West Khasia, Assam (*Beddome*).

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* Proc. Malac. Soc. London, v, 1903, p. 278.

In shape *P. nutans* somewhat resembles the var. *theobaldiana* of *P. tapeina*, but the shell is much thinner, the whorls are more flattened above and less tumid below, the keel is more pronounced and pinched and the aperture quite different. The principal character, however, separating it from *P. tapeina* and its varieties lies in the absence of cuticular granules or squamæ and in the deciduous cuticle. I found specimens in Mr. Leman's collection and in the British Museum—both the Blanford and the general collection—with the MS. name *Trachia nutans*, Blf.

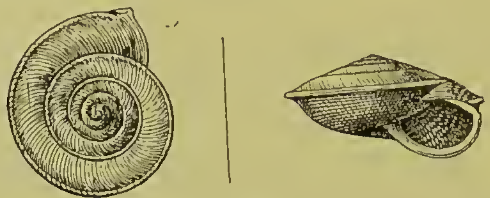

Fig. 83.—*Plectotropis nutans.*
(From Proc. Malac. Soc. London.)

The specimen in the general collection is a trifle larger, measuring 18 mm. in diameter, and more solid, while the last whorl descends for a considerable distance, but this does not seem to me to be a normal feature. Mr. Ponsonby possesses two specimens, received from Lt.-Col. Godwin-Austen, labelled "Habiang, Garo." One of these also measures 18 mm. in diameter and it has the aperture more dilated and the basal and columellar margins more curved than the other specimens I have seen.

187. **Plectotropis tapeina**, *Benson.*

Helix tapeina, Benson, J. A. S. B. v, 1836, p. 352; ibid., A. M. N. H. ix, 1842, p. 486; Reeve, Conch. Icon. vii, 1852, pl. 125, fig. 750; Pfeiffer, Conch.-Cab., *Helix*, iii, 1854, p. 334, pl. 131, figs. 14, 15; Blanford, J. A. S. B. xxxiv, 1865, p. 89; Hanley & Theobald, Conch. Ind. 1870, pl. 15, fig. 6; Nevill in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 876.

Helix huttoni, var. *tapeina*, Godwin-Austen, J. A. S. B. xlv, 1876, p. 312.

Helix (Plectotropis) tapeina, Nevill, Hand List, i, 1878, p. 74; Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 324; Tryon, Man. Conch. ser. 2, iv, 1888, p. 53, pl. 12, fig. 71.

Eulota (Plectotropis) tapeina, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 209.

Original description:—"Testa subconoidea, supra convexa, subtus tumida; epidermide minutissime corrugata; peripheria angulata, peristomate non continuo, subreflexo. Umbilico mediocri, profundo; omnes anfractus exhibente." (*Benson.*)
"Diam. 0·6 poll. [=15 mm.]."

Hab. India: Silhet (*Benson*); Khasi Hills, Assam (*Godwin-Austen*, *Stoliczka*); Cherrapoonjee, Assam (*Anderson*); Harmutti, Dafla Hills (*Godwin-Austen*, *Stoliczka*). Burma: Prome (*Fea*).

The species varies considerably in size, specimens from Cherrapoonjee, in the writer's possession, sent by a native collector, ranging from 11·5–10·5–6 to 16·5–14·75–9·5 mm. A specimen in the Benson collection is abnormally high iu the spire, measuring: diam. 11·5, alt. 8·75 mm.

P. tapeina has been confused with *P. rotatoria*, v. d. Busch, a Java species, and *P. trichotropis*, Pfr., a Chinese form. Nevill, in fact, records a variety *rotatoria*, Buchanan (apparently a misprint for v. d. Busch), from Bhamo, Manwyne, and Shan Hills near Ava, and Assam. *P. rotatoria*, however, is quite distinct, having more flattened whorls, a sharp keel at the periphery, and a deeper and wider umbilicus. Tapparone Canefri recognised that the form recorded as var. *rotatoria* was distinct from that species, and he separated the Burmese form, thus named, as *P. theobaldiana*.

Nevill regarded *akowtongensis* and *rotatoria* as doubtfully separable *, thinking the differences might " be merely perhaps incidental to individuals, and not eveu to local races."

In the same paper (p. 19) he refers some specimens taken by Godwin-Austen in the Khasi Hills to *P. trichotropis*, Pfr., stating his belief that one of them is represented by pl. 15, fig. 4, of Conch. Ind.

I do not think this Chinese species occurs in the Indian region, and am firmly convinced that Nevill wrongly identified his specimens. *P. trichotropis*, which bears no resemblance to the figure quoted, has a more trochoid spire, the whorls are more flattened above and the suture is consequently much shallower, while the whorls below are much more inflated; the keel is more pronounced and situate higher up, and is, moreover, ornamented with a friuge, a feature I have never observed in any of the Assam or Burma shells, in however fresh condition. The aperture further differs in being less dilated transversely, being in fact almost auriculate, and the columellar margin is more oblique and, being straight, it forms an obtuse angle with the basal margin. The umbilicus, too, although not wider is more open and distinctly angulated. The sculpture, finally, is also quite different in *trichotropis*, consisting of elongated squamæ, both above and below.

Nevill further mentions a variety *subcatostoma* from the Naga Hills and Bhamo †, but he gives no description.

The shell reproduced on plate 15, fig. 6, of Conch. Ind. has the last whorl descending for some distance below the periphery of the penultimate whorl. Although similar forms frequently occur I do not consider this typical, the normal form having the last whorl abruptly deflexed in front.

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* J. A. S. B. xlvi, 1877, p. 17.
† Hand List, i, 1878, p. 74.

Var. theobaldiana, *Tapparone Canefri.*

Helix rotatoria, Theobald, J. A. S. B. xxviii, 1859, p. 318; Blanford, J. A. S. B. xxxiv, 1865, p. 89; Hanley & Theobald, Conch. Ind. 1870, pl. 15, fig. 5 (non *H. rotatoria*, v. d. Busch).
Helix (*Plectotropis*) *tapeina*, var. *rotatoria* (Buchanan !), Nevill, Hand List, i, 1878, p. 74.
Helix (*Plectotropis*) *tapeina*, var. *rotatoria*, Tryon, Man. Conch. ser. 2, iv, 1888, p. 54, pl. 12, fig. 77.
Helix (*Plectotropis*) *theobaldiana*, Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 324.

I have already shown that the form referred to *rotatoria* by Theobald is quite distinct from the Java species. From typical *tapeina* it differs in having the whorls flattened, and in the periphery being sharply keeled as far as the aperture. In size it varies considerably like the type, specimens in my possession from Cherrapoonjee, received from a native collector, ranging from diam. maj. 11·5, min. 10·5, alt. 6 mm. to 17 : 15 : 8·5 mm.

Hab. Burma: Teria Ghat (*Theobald*), Manwyne and Bhamo (*Anderson*), Shan Hills, near Ava (*Blanford*); Upper Irrawaddy (*Fea*). India: Assam (*Stoliczka*).

Var. akowtongensis, *Theobald.*

Helix akowtongensis, Theobald, J. A. S. B. xxviii, 1859, p. 306.
Helix akoutongensis, Blanford, J. A. S. B. xxxiv, 1865, p. 89; Hanley & Theobald, Conch. Ind. 1870, pl. 15, fig. 4.
Helix (*Plectotropis*) *tapeina*, var. *akoutongensis*, Nevill, J. A. S. B. xlvi, 1877, p. 17; ibid. in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 876; ibid., Hand List, i, 1878, p. 74.
Helix (*Plectotropis*) *akowtongensis*, Tryon, Man. Conch. ser. 2, iv, 1888, p. 57, pl. 12, fig. 73.
Eulota (*Plectotropis*) *akoutongensis*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 209.

Diam. 13·5–14·5, alt. 5·5–6·25 mm.

Hab. Burma: Akowtong, Pegu, banks of Irrawaddy (*Theobald*), Thyet Myo (*Blanford*), Ava and Tsagain (*Anderson*).

Differs from typical *tapeina* in being more depressed in the spire, consequently more widely umbilicated, and in the last whorl being more deflexed in front, while the peripheral keel is also more acute and the aperture more transverse. The elongated granules of the periostracum, moreover, are much more pronounced and coarser.

Var. perplanata, *Nevill.*

Helix (*Plectotropis*) *perplanata*, Nevill, J. A. S. B. xlvi, 1877, p. 19; ibid., Hand List, i, 1878, p. 73; ibid. in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 878.
Helix (*Ægista*) *perplanata*, Nevill, J. A. S. B. l, 1881, p. 133, pl. 5, fig. 21.
Helix (*Plectotropis*) *perplanata*, Tryon, Man. Conch. ser. 2, 1888, p. 57, pl. 13, figs. 49–51.

Eulota (Plectotropis) perplanata, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 209.

When first publishing the name, Nevill was undecided whether it was a distinct form, a variety of *H. trichotropis*, or of *H. tapeina* (near var. *rotatoria*). I have already stated my reasons for considering that neither *P. trichotropis* nor *P. rotatoria* occur within the limits of the Indian region, and I regard *H. perplanata* simply as a form closely allied to the variety *akowtongensis*, from which it may be separated by the larger diameter and the more depressed spire.

Var. **bhamoensis**, *Nevill.*

Helix (Plectotropis) tapeina, var. *bhamoensis*, Nevill, J. A. S. B. xlvi, 1877, p. 18; ibid., in Anderson, Zool. Res. Two Exped. West. Yunnan, 1878, p. 877.

"Distinguished from typical *H. tapeina* by the last whorl, which is only slightly angular and not distinctly keeled; the aperture is smaller and less produced, while the columellar margin is slightly oblique and angular at the base. It is smoother and less depressed than the var. *rotatoria*, with squarer aperture and without the acute keel at the periphery. The raised spire and angulate (not keeled) periphery agree with those of *H. phayrei*; it is, however, smoother, less openly umbilicated, with more contracted aperture and less developed sculpture than that species. This variety connects *H. tapeina* almost insensibly with *H. catostoma* and its varieties. Plate 15, fig. 10 of Conch. Ind. is much more like it than *H. arakanensis*." (*Nevill.*)

Diam. 12·5, axis 6·5 mm.

Hab. Burma: Bhamo (*Anderson*). India: Naga Hills (*Godwin-Austen*).

I have not seen any specimen answering to Nevill's definition of this variety, and it is somewhat difficult to understand what he means when he states that it differs from *tapeina* "by the last whorl, which is slightly angular and not distinctly keeled," winding up with the statement that "plate 15, fig. 10, of Conch. Ind. is much more like it than *H. arakanensis*," seeing that the figure referred to is distinctly keeled.

Genus **ÆGISTA**, *von Martens*.

Ægista (Albers), von Martens, Die Heliceen, ed. 2, 1860, p. 121.
Ægista, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 210, as section of *Eulota*, pl. 65, fig. 10 (jaw), fig. 9 (radula).

Type, *Helix oculus*, Pfeiffer.

Range. India, Burma, Farther India, Japan, China and adjacent islands, south to the Malay Archipelago.

"Shell depressed and broadly umbilicated, solid, striated; brown, unicolored or with a light peripheral band; spire low, composed of many narrow whorls, the last not keeled, descending

in front. Aperture round lunar, oblique, peristome toothless, narrowly expanded, somewhat thickened within, reflexed at base, ends converging.

"External anatomy and genitalia unknown. Jaw arcuate, with about 6 wide, low, but separated ribs. Radula showing the same characters described for *Plectotropis*, but the outer marginals have the ectocone bifid.

"Shells of this section differ from *Plectotropis* in lacking the peripheral keel and in the smoother surface, but there are some intermediate species. It has the same geographic range, extending northwards to Kiusiu Island, Japan. The jaw of the only species examined has fewer ribs than in *Plectotropis*, but this is not likely to prove a constant difference." (*Pilsbry.*)

188. **Ægista phayrei**, *Theobald.*

Helix phayrei, Theobald, J. A. S. B. xxviii, 1859, p. 306; Blanford, J. A. S. B. xxxiv, 1865, p. 90; Hanley & Theobald, Conch. Ind. 1870, pl. 15, fig. 1.

Helix (Plectotropis) phayrei, Nevill in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 879; Tryon, Man. Conch. ser. 2, iv, 1888, p. 55, pl. 12, fig. 78.

Helix (Camaena) phayrei, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 191.

Helix (Euhadra) phayrei, Pilsbry, Man. Conch. ser. 2, vi, 1890, p. 114, pl. 32, fig. 53.

Eulota (Ægista) phayrei, Pilsbry, op. cit. ix, 1895, p. 210.

Original description :—"Testa lenticulari, infundibuliforme-umbilicata, obtuse-carinata, lineis transversis flexuosis et confluentibus fortiter striata; anfract. 6, convexiusculis, sutura impressa, apertura obliqua, subquadrata. Perist. tenui, reflexiusculo.

"Diam. 0·68 [=17 mm.], alt. 0·30 [=7·75 mm.]." (*Theobald.*)

Hab. Burma: between Ava and Prome, banks of Irrawaddy (*Oldham*).

Three specimens, from Ava, in the late Col. Beddome's collection, kindly placed at my disposal by Mr. Leman, its present owner, enable me to supplement the somewhat meagre original description.

Shell depressed conoid, moderately but deeply umbilicated, rather solid, fuscous corneous, coarsely striated and densely covered with elongate papillæ, which coincide more or less with the striæ. Spire depressed, suture rather shallow, apex acute. Whorls 5½–6, increasing slowly and regularly, flattened, the last convex below, angulated at the periphery and around the umbilicus, slightly dilated towards the mouth, not perceptibly descending or deflexed in front. Aperture oblique, ovate-circular, margins slightly approaching, united by a thin callus on the parietal wall; peristome a little thickened and shortly reflexed; upper, outer, and basal margins regularly curved, columellar margin forming a slight angle with the basal margin, obliquely

ascending, triangularly dilated, scarcely reflexed over the umbilicus, which is funiculate and moderately wide, exhibiting the whole of the penultimate whorl. Major diam. 15–17, minor 13·5–15 mm.; alt. 7·25–9 mm.

189. **Ægista catostoma**, *Blanford.*

Helix (*Trachia*) *catostoma*, Blanford, P. Z. S. 1869, p. 447; Hanley & Theobald, Conch. Ind. 1870, pl. 56, figs. 2, 3.
Helix (*Plectotropis*) *catostoma*, Nevill in Anderson, Zool. Res. Two Exped. West. Yunnan, i, 1878, p. 878; ibid., Hand List, i, 1878, p. 73.
Helix (*Plectotropis* (*Ægista*)) *catostoma*, Tryon, Man. Conch. ser. 2, iv, 1888, p. 62, pl. 13, figs. 36, 37.
Eulota (*Plectotropis*) *catostoma*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 209.

Original description:—"Testa late umbilicata, depressa, subdiscoidea, cornea, tenuis, striata. Spira depresso-convexa, sutura leviter impressa. Anfr. 7, convexi, arcte convoluti, ultimus rotundatus, circa umbilicum subcompressus, antice abrupte deflexus, valde descendens, pone aperturam subconstrictus. Apertura fere horizontalis, truncato-ovata; peristoma album, reflexum, antice et postice prope anfractum penultimatum arcuatum, marginibus subdistanter convergentibus, callo tenui junctis; umbilicus latissimus pervius." (*Blanford.*)

Maj. diam. 16–18, min. 14·5–16, alt. 8·5–9·5 mm.

Hab. India: Dihing, Khasi Hills (*Godwin-Austen*); Naga Hills (*Chennell*). Burma: Bhamo (*Hungerford*). China: Ponsee, Yunnan (*Anderson*).

Blanford called it a peculiar form, resembling *H. oldhami*, but with the mouth somewhat as in *H. nilagirica*. In contour it certainly somewhat assimilates with the former, but the mouth I consider more like that of *atkinsoni*. The last whorl suddenly and deeply descends in front, the superior margin of the peristome is sinuous in outline, projecting forward in the middle. In a specimen I received from the late Col. Beddome the base of the last whorl is decidedly flattened for a short distance behind the peristome and the basal margin is accordingly almost straight, with a dentiform callus on the inner side. Mr. Ponsonby possesses a similar specimen also received from Col. Beddome, and both agree well with the figure in Conch. Ind. in this respect as they do in size, the major diameter being only 13·5 mm. The junction of the basal and columellar margins forms nearly a right angle and the aperture may in fact be called subquadrate. Two specimens in the British Museum, however, collected by Hungerford at Bhamo, do not possess the flattened base, nor the denticle on the basal margin of the peristome, but have the mouth gibbous behind the peristome. These distinctly show spiral striæ below the periostracum, regular above and irregular below the periphery,

the peristracum itself bearing elongate papillæ. One of these specimens measures 18 : 16 : 9·5 mm. and the other 16·5 : 14·5 : 8·5 mm.

190. Ægista emensa, *Godwin-Austen.*

Helix (*Trachia*) *emensus*, Godwin-Austen, P. Z. S. 1888, p. 242.
Eulota (*Plectotropis*) *emensus*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 209.

Original description :—"Shell subdiscoid, widely umbilicated; sculpture ill-defined irregular transverse striation; colour horny or pale ochraceous; spire subconoid, apex blunt; suture shallow; whorls 7, regular, flat, closely wound, the last descending

Fig. 84.—*Ægista emensa.*

suddenly, subangulate on periphery; aperture nearly circular, oblique; peristome much reflected below, the margins joined by callus on body-whorl.

"Size: maj. diam. 13·5, min. 11·8, alt. axis 4·8 mm." (*Godwin-Austen.*)

Hab. Burma: Hlindet (*Spratt*).

"This species belongs to the widely distributed group in this part of India represented by *H. akoutongensis*, *oldhami*, etc. This form is much smaller, and differs sufficiently from all the species I know."

The present species is allied to *P. catostoma*, but the last whorl is less deflexed in front and keeled at the periphery instead of angulated, the upper portion being slightly impressed above the keel. It further differs from that species by the umbilicus being not quite so infundibuliform and a little wider, showing more of the penultimate whorl. The periostracum is papillate.

The above figures have been prepared from the type in the British Museum.

191. Ægista clara, *Godwin-Austen.*

Helix (*Trachia*) *clarus*, Godwin-Austen, P. Z. S. 1888, p. 242.
Eulota (*Plectotropis*) *clarus*, Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 209.

Original description :—"Shell subdiscoid, openly umbilicated; sculpture irregular, close transverse striation; colour white (but both specimens are bleached); spire depressedly conical, apex rounded; suture shallow; whorls 5, flat subangulate on periphery, the last slightly descending; aperture oval, very oblique; peristome thin, slightly reflected.

"Size: maj. diam. 9·5, min. 8·5, alt. axis 4 mm." (*Godwin-Austen.*)

Hab. Burma: Hlindet (*Spratt*).

"This species belongs to the *Helix huttoni* group of shells, but is quite distinct, especially in the shape of the aperture."

A specimen in my collection is distinctly papillate and pale

Fig. 85.—*Ægista clara.*

corneous. It has a peripheral keel slightly impressed above and below and is subangulated around the wide open umbilicus. It is, moreover, a trifle larger than the type, measuring 10 mm. in diameter.

The above figures have been prepared from the type in the British Museum.

192. Ægista mitanensis, *Godwin-Austen.*

Helix (Ægista) mitanensis, Godwin-Austen, A. M. N. H. ser. 6, iii, 1889, p. 108.
Helix (Ægista) mitanensis, Pilsbry, Man. Conch. ser. 2, viii, 1893, p. 195.
Eulota (Plectotropis) mitanensis, Pilsbry, op. cit. ix, 1895, p. 209.

Original description:—"Shell globosely pyramidal, openly umbilicated; sculpture smooth, the shell covered with a thick epidermis, having a finely papillate structure; colour dark olive-green or pale umber; spire conic, high, apex blunt; suture impressed; whorls 6, rather convex and rounded below, the last descending abruptly at the aperture; aperture circular; peristome strong, white, with a sinuate margin above; columellar margin oblique."

"Diam. maj. 10·9; min. 9·4; alt. axis 6·7; body-whorl 5·2 mm."

Hab. Burma: Mitan, under Mouleyit Range, Moulmein (*Limborg*).

"Animal with dark tentacles, long and fine; body papillate near the head, pale, dusky on the upper surface; foot short behind and pointed. In some specimens the head and tentacles were jet-black, the rest of the body pale indigo." (*Godwin-Austen.*)

193. Ægista congener, *Preston.*

Ægista congener, Preston, Proc. Malac. Soc. London, xi, 1914, p. 20, text-figure.

Original description:—"Shell differing from *Helix catostoma* in

its more exserted spire and much narrower umbilicus, and in the shape of the aperture, which is much more open and circular in that species." (*Preston.*)

"Major diam. 12, min. 10 mm.; alt. 10 mm. Apert. alt. 4·25, diam. 3·5 mm. (type)."

Hab. India: Naga Hills.

"The series of this shell which I have before me varies considerably in diameter." (*Preston.*)

The foregoing meagre description may be supplemented from the type in the British Museum as follows:—

Shell depressed trochoid, light corneous, finely and rather regularly striated, the upper side in places covered with excessively minute spiral striæ, more distinct on the lower side. Apex obtuse, spire depressed, suture deep. Whorls 6, increasing slowly and regularly, slightly convex, obscurely angulated at the periphery, somewhat flattened below and obscurely angulated around the umbilicus, last whorl dilated towards the mouth, shortly descending in front. Aperture ovate-rotundate, oblique, peristome white, slightly thickened, shortly reflexed; margins approaching, columellar slightly dilated. Umbilicus wide, perspective.

Ægista mitanensis is proportionately much higher in the axis and the umbilicus, consequently, is more contracted; it has the periphery keeled and is darker in colour. The measurements of the type of *Ægista congener*, including the peristome, are as follows:—major diam. 11, minor 10, alt. 6 mm.

194. Ægista coeni, *Preston.*

Ægista coeni, Preston, Proc. Malac. Soc. London, xi, 1914, p. 19, text-figure.

Original description:—"Shell broadly turbinate, dark reddish brown; whorls 6, regularly increasing, not very convex, marked with closely-set, oblique growth striæ; base of shell also marked with lines of growth and very finely spirally striate; suture well marked; umbilicus wide and deep; columella whitish, diaphanous, rather broadly expanded above, obliquely descending; labrum not thickened, narrowly reflexed; aperture obliquely subcircular." (*Preston.*)

Maj. diam. 9·5, min. 8·25 mm.; alt. 6 mm.

Hab. India: Naga Hills.

Genus VALLONIA, *Risso.*

Vallonia, Risso, Hist. Nat. Europe mérid. iv, 1826, p. 101; Westerlund, Fauna Paläarct. Binnenconch. i, 1889, pp. 2, 14; Sterki, Proc. Acad. Nat. Sci. Philadelphia, 1893, p. 234 (jaw and dentition);

ibid., Man. Conch. ser. 2, viii, 1893, p. 247; Pilsbry, Man. Conch. ser. 2, ix, 1895, p. 282, pl. 70, fig. 29 (jaw), fig. 38 (radula), pl. 63, figs. 9, 10 (genitalia).

Lucena, Hartmann in Sturm, Deutschlands Fauna, vi, part 5, 1821, p. 40 (non Oken, 1815); Moquin-Tandon, Hist. Nat. Moll. France, ii, 1856, p. 140.

Amplexis, Brown, Ill. Conch. Great Britain, 1827, expl. pl. 41; *Amplexus*, ibid., ed. 2, 1844, p. 45.

Zurama (Leach), Turton, Man. 1831, p. 64.

Chilostoma (partim), Fitzinger, Beitr. Landesk. Oesterreichs, iii, 1833, p. 98.

Circinaria (partim), Beck, Index Moll. 1838, p. 23.

Glaphyra (partim), Albers, Die Heliceen, 1850, p. 87.

TYPE, *Helix pulchella*, Müller.

Range. North America south to Texas; Japan, China, India; Europe, Northern Africa, and Atlantic Islands.

"Shell *minute, openly and widely umbilicate, depressed*, the spire low-convex, consisting of 3–4½ whorls, color light and uniform; surface smooth or ribbed; periphery rounded; last whorl usually descending in front. Aperture oblique, circular or short-oval; *peristome continuous or nearly so, expanded or reflexed*, often thickened within.

"Foot small, short, with no pedal grooves; edge of sole somewhat crenulated; sole undivided; eye-peduncles cylindrical, not enlarged distally; tentacles short; labial lobes well developed.

"Jaw arcuate, with a slight median projection or none, sculptured with numerous (18 to 25) crowded, low riblets, denticulating the margins.

"Radula having 23 to 33 teeth in a transverse row. *Median teeth decidedly narrower than laterals*, tricuspid, the *mesocone not half as long as basal plate*, side cusps smaller. Laterals with large square basal plates, the mesocone extending to its edge, ectocone small. Marginal teeth wide and low, multicuspid.

"Genitalia having the penis short, with terminal retractor; epiphallus short, bearing a flagellum. Dart sack present, single, containing a straight, bladeless dart. No mucus glands. Duct of spermatheca long, branchless." (*Pilsbry*.)

195. Vallonia pulchella, *Müller*.

Helix pulchella, Müller, Verm. Terr. Fluv. Hist. ii, 1774, p. 30; Rossmässler, Iconogr. ii, 1838, fig. 440; Binney, Boston Journ. Nat. Hist. iii, 1840, p. 375, pl. 9, fig. 2; ibid., Terr. Moll. United States, i, 1851, pl. 9, figs. 7–9 (anatomy), iii, 1857, pl. 17, fig. 1 (shell); Lehmann, Leb. Schnecken Stettins, 1873, p. 90, pl. 11, fig. 30 (anatomy).

Helix (*Amplexis*) *paludosus*, Brown, Ill. Conch. 1827, pl. 41, figs. 76, 77.

Helix (*Amplexus*) *pulchella*, Brown, Ill. Conch. ed. 2, 1844, p. 45, pl. 14, figs. 76, 77.

Helix (*Glaphyra*) *pulchella*, Albers, Die Heliceen, 1850, p. 87.

Helix (*Vallonia*) *pulchella*, von Martens, Die Heliceen, ed. 2, 1860, p. 101; Nevill, Hand List, i, 1878, p. 75.
Vallonia pulchella, W. G. Binney, Terr. Moll. United States, v, 1878, p. 344, pl. 17, fig. 1; Theobald, J. A. S. B. xlvii, 1878, p. 144; Sterki, Proc. Acad. Nat. Sci. Philadelphia, 1893, p. 246, pl. 8, figs. A, G (radula), H, I, K, L (jaw); ibid., Man. Conch. ser. 2, viii, 1893, p. 248, pl. 32, figs. 1–5; Pilsbry, op. cit. ix, 1895, p. 283, pl. 55, figs. 31, 32.

Original description:—"Helix testa umbilicata, subdepressa, alba, glabra, apertura circinnata; labro tereti, reflexo.

"*Testa* tota alba, glabra, subpellucida, supra planiuscula, subtus aliquantum convexa. Vertex testæ, dum limax eam inhabitat, luteolus. *Anfractus* vix quatuor, subtus unicus. *Apertura* fere circularis, limbo elevato, tereti, reflexo. *Teste* quidem striata est, at striæ microscopio tantum visibilis." (*Müller*.)

The above cursory description has been supplemented by Sterki in his admirable and exhaustive treatment of the genus *Vallonia* as follows:—

"*Moderately umbilicated*, more widely for the last half whorl; convex or depressed conic above; *straw colored*, transparent, *with fine and dense striæ* which are more regular at the suture and umbilicus; smooth at the nucleus; whorls 3⅓–4, rather rapidly increasing, with a moderately deep suture, the last comparatively large, well rounded, little expanded towards the aperture, *not descending in front*, or slightly so at the suture. Aperture moderately oblique and inclined, forming five-sixths of a circle; *peristome* abruptly everted, with *a strong white lip*, thinner at either end."

Greater diam. 2·4, lesser 2; alt. 1·2 mm.

Hab. Circumboreal Europe; Northern and Eastern Asia, as far south as Kashmir; Northern Africa; the Azores and Madeira; greater part of North America.

"The last whorl is slightly ascending or descending in front, in a good part of the specimens. Sometimes the shell is whitish, milky-opaque, in living examples; this seems to be a local variation, as all the specimens in certain places show this peculiarity. The size of the shell varies from 2·1 to 2·7 greater diam., 2·4 being the average.

"Jaw rather strongly curved, with obtuse ends; no median projection on the cutting edge, which is denticulated, corresponding to the 10–20 rather sharp, longitudinal ribs, quite irregular in size, course, and distribution, but wanting at the side ends of the jaw. The radula has 65–68 transverse rows of 27 teeth; of the five laterals the fifth has a small plate and the ectodont double pointed."

There is nothing to be added to this excellent account. I have refrained from giving the complete bibliography of the species, or the whole synonymy, as this would not serve any useful purpose.

196. **Vallonia costata**, *Müller.*

Helix costata, Müller, Verm. Terr. Fluv. Hist. ii, 1774, p. 30; Rossmässler, Iconogr. ii, 1838, fig. 439; Chenu, Man. Conchyl. i, part 2, 1860, p. 452, fig. 3368.
Helix (*Amplexis*) *crenellus*, Brown, Ill. Conch. 1821, pl. 41, figs. 78, 79.
Helix (*Amplexus*) *crenella*, ibid., ed. 2, 1844, p. 45, pl. 14, figs. 78, 79.
Helix (*Glaphyra*) *costata*, Albers, Die Heliceen, 1850, p. 87.
Helix (*Vallonia*) *pulchella*, var. *costata*, von Martens, Die Heliceen, ed. 2, 1860, p. 101; Nevill, Hand List, i, 1878, p. 75.
Vallonia costata, Theobald, J. A. S. B. xlvii, 1878, p. 144; Sterki, Proc. Acad. Nat. Sci. Philadelphia, 1893, p. 259, pl. 8, fig. C (radula), N (jaw); ibid., Man. Conch. ser. 2, viii, 1893, p. 252, pl. 32, figs. 18–22, 27, pl. 33, fig. 54.

Original description:—"Helix testa subdepressa, umbilicata, cinerea; spiris costatis; apertura circulari; labro albo reflexo.

"*Testa* convexiuscula, opaca, supra fuscescens, subtus pallida. *Anfractus* quatuor externe costati, sive plicis transversis armati; in majori anfractu triginta numeravi; hic subtus glaber est. *Apertura* circularis; vix duodecima peripheriæ pars ab anfractu opposito intersecatur, cum in antecedente fere quarta. Costæ, si testa lumini obvertatur, in sola apertura transparent. *Labrum* album, planum, reflexum." (*Müller.*)

"Moderately umbilicated, more widely so for the last half whorl, *depressed* convex *above*, or nearly flat; greyish to light or reddish horn colored, with rather regularly set *membranous ribs* and finer striæ between them; nucleus with fine revolving lines. Whorls $3\frac{1}{2}$, slightly flattened above and below the periphery, at the circumference somewhat angular, with a *deep suture*, rather rapidly increasing; the last whorl expanding to the aperture shortly and moderately *descending in front, more so at the suture* than on the back. Aperture rather oblique and inclined, *almost circular*, a little flattened above, ends of margin much approximating, slightly protracted and auricled, connected by a thin callus; *peristome strongly* and abruptly *everted, with a strong* white lip."

Greater diam. 2·5, lesser 2·1, alt. 1·1 mm.

Hab. Circumboreal Europe; Northern and Eastern Asia, as far south as Kashmir; Northern Africa; greater part of North America.

"Jaw rather curved. Radula with 69–72 transverse rows of 27 or 29 teeth; 5 perfect laterals, on which the cusps are comparatively small, especially the ectodonts. On the marginals the 6–7 cusps stand immediately on the plate, not on a common base.

"*V. costata* has, by most authors, been regarded as a variety of *pulchella*; but it is sufficiently different to be distinguished at first sight; the less elevated spire, with the deeper suture, the whorls not so well rounded, the last descending in front, the more obliquo and more circular aperture with approximate margins, characterize

quite a different shell, even if we omit mention of the most conspicuous feature of fresh specimens, the membranous ribs, which this species has in common with a number of other forms of this group and the next [group of *V. cyclophorella*]. Between each pair of these ribs are 3 to 6 finer striæ; and under the microscope very fine lines are seen, nearly parallel to the lines of growth at the suture, while on the periphery they are variously intercrossing. The nucleus, or embryonal whorls, bear a number of microscopic revolving lines, in this as well as in the other species of this group.

"*V. costata* is rather variable. The largest measure 2·7, the smallest 2·1 mm. greater diameter. Always the sutural part of the last whorl descends more to the aperture than the back or peripheral part of the whorl, and sometimes the latter keeps exactly in the horizontal direction to the very margin of the lip. The number of ribs was found to be from 23–35 in the type. Some forms differ so much that they are to be considered varieties." (*Sterki.*)

197. Vallonia ladakensis, *Nevill.*

Helix (*Vallonia*) *ladacensis*, Nevill, Scient. Results Second Yarkand Mission, Mollusca, 1878, p. 4; von Martens, Mém. Acad. Imp. Sci. St. Petersburg, ser. 7, xxx, no. 11, 1882, p. 3, pl. 3, fig. 3.

Helix (*Vallonia*) *pulchella*, var. *ladakensis*, Nevill, Hand List, i, 1878, p. 75.

Vallonia ladacensis, Sterki, Man. Conch. ser. 2, viii, 1893, p. 260, pl. 56, figs. 19–21; Möllendorff, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersburg, iv, 1899, p. 142.

Original description:—"I have long separated this form, which can be distinguished from all the varieties of *H. costata* at a glance by its much more open umbilicus, at least half as open again; it is a much larger shell than typical *H. costata*, about the same size (a trifle larger) as the above described var. *asiatica*; the sculpture is finer, closer together, and more beautifully regular; the spire is flatter, the suture more excavated; the base is scarcely, if at all, subangulate near the umbilicus, as it is in so marked a way in the preceding; one of the best characteristics of *H. ladacensis* is the considerably higher and more expanded aperture with a corresponding less oblique columella; the umbilicus is so much more open that the whorls within can be clearly traced up to the apex itself." (*Nevill.*)

Diam. 3¼, alt. 1½ mm.

Hab. India: Kashmir, Mataian, Dras Valley, Ladak (*Stoliczka*), Leh, Ladak (*Stoliczka*); Spiti, Punjab (*Stoliczka*). W. Tibet (*Stoliczka*). Turkestan: Tiau-shan Mountains (*Potanin*).

198. **Vallonia miserrima**, *Gude.*

Vallonia miserrima, Gude, Proc. Malac. Soc. London, vii, 1907, p. 307, text-figures.

Original description:—"Shell widely umbilicated, depressed turbinate, greyish white, translucent; nepionic whorls smooth, the remainder finely and closely ribbed. Spire depressed, apex obtuse, suture deep. Whorls nearly 4, tumid, not sloping towards the umbilicus, increasing regularly, except the last quarter whorl, which widens suddenly, descending deeply in front and dilated behind the peristome. Aperture obovate, oblique; margins convergent, united by a thin callus on the parietal wall; peristome thin, slightly expanded and reflexed; margins evenly rounded,

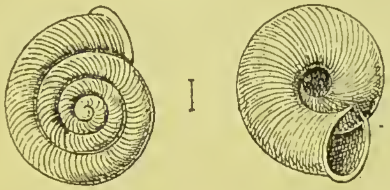

Fig. 86.—*Vallonia miserrima*. (From Proc. Malac. Soc. London.)

columellar margin triangularly dilated and impinging upon the wide open umbilicus." (*Gude.*)

Diam. major 3, min. 2·5 mm.

Hab. India: Anamullay Hills (*Beddome*).

This form is allied to *V. ladakensis*, Nevill, but it is more excentric than that species, and the last whorl descends more deeply in front, the whorls are more tumid, the body-whorl is more compressed, the suture deeper, and the last quarter whorl is more dilated, while the umbilicus is more open and the columellar margin more dilated.

The shells from which this species was described were collected by the late Col. Beddome in the early sixties of last century in the interior of the Anamullay Hills, at an elevation of about 3000 feet. When in 1907 he handed the shells to me for description, he informed me that no European had visited the locality previously. No *Vallonia* had at that time been recorded so far south in Asia, and the occurrence in Southern India of a species belonging to so typically palæarctic and nearctic a genus is somewhat disconcerting, especially since, in view of the fact that Beddome was the first European to visit the locality, the possibility of its introduction with plants is excluded.

Family ENIDÆ.

Genus ENA, *Turton.*

Ena (Leach MS.), Turton, Manual, 1831, p. 80; Gray, in Turton, Man. Ed. n. 1840, p. 181.
Bulimina, Ehrenberg, Symb. Phys. Anim. Evert. ser. 1, Moll. 1831; *decas prima*, signature *d*, fourth page (non *Bulimina*, D'Orbigny, 1826).
Buliminus, Beck, Index Mollusc. 1839, p. 68; von Martens, Die Heliceen, ed. 2, 1860, p. 228; Lehmann, Leb. Schn. Stettins, 1873, p. 130; Hesse, Jahrb. Deuts. Malak. Ges. xii, 1885, p. 48 (anatomy); Westerlund, Fauna Paläarct. iii, 1887, p. 1; von Martens, Besch. Weichth. Deutsch-Ost-Afrikas, 1897, p. 59; Jacobi, Journ. Coll. Sci. Tokyo, xii, 1898, p. 76, pl. 6, figs. 113-115 (anatomy); Wiegmann, Ann. Mus. Zool. St. Petersburg, vi, 1901, p. 220 (anatomy); Beck, Jenaische Zeit. Nat. xlviii, 1912, p. 187 (anatomy).

TYPE, *Bulimus montanus*, Draparnaud.

Range. Europe, Africa, Continental Asia.

Shell perforate, from shortly ovate and ovate-conoid to fusiform-cylindrical. Aperture elongate, generally equalling $\frac{1}{3}$ or $\frac{1}{4}$ of the total height; peristome simple or thickened, straight, expanded, or reflexed, the margins usually connected by a thin callus, with or without a denticle near the upper margin; columellar margin straight.

Animal (*E. obscura*) elongate-ovate, scarcely attenuated in front, almost truncate, tail elongate, pointed; greyish-yellow, with dark grey head, back, and tentacles; the latter frequently giving off two dark stripes which run along the back.

Jaw semicircular, slightly curved, with about 20 fine ribs denticulating the margins. Radula leaf-like anteriorly, attenuated posteriorly, bearing 50 longitudinal and 125 transverse rows of teeth. Middle tooth smaller than the laterals, with square basal plate and hooked middle cusp, which is sharp, conical, simple. Laterals with a pointed base and one or two short side cusps.

Genitalia: the hermaphrodite gland is of the usual form, the long chain-like ovisperm duct connecting it with the uterus, from the base of which the vas deferens proceeds to the penis. The penis is of peculiar shape, its lower portion being attenuated towards the cloaca, and becoming dilated distally; the latter short, stout portion divides into two branches, the one proceeding upwards at a right angle, when it suddenly becomes twisted and, forming another right angle, continues in a horizontal direction, terminating in a rounded bulb, the latter receives the vas deferens. The rather long retractor muscle is attached to the lower part of the vertical portion. The other branch at first proceeds in the same direction, then curves upwards at an obtuse angle, decreasing

in size and becoming filiform, undulating, and terminating in a curved, thin, long and club-shaped flagellum. The albumen gland is elongate, lingulate; the uterus broad, strongly wrinkled, the vagina in length almost equalling the uterus. The vagina branches above the penis, but on the other side, into the spermatheca duct, which is moderately long and strong, equalling the vagina in length and terminating in the spermatheca. (*Lehmann.*)

Jacobi, in his paper entitled "Japanische Beschalte Pulmonaten"*, when dealing with the Japanese *Buliminus reinianus*, Kobelt—referred to the subgenus *Mirus* by Möllendorff—alludes to the fact that Lehmann had already drawn attention to the presence in *Buliminus* [*Ena*] *obscurus* of a peculiar organ—the appendix—proceeding from the penis close to the atrium. In *reinianus* this organ is also present but possesses some special characters. While having the same diameter and possessing equally solid walls as in *obscurus*, it is here only one-third its length, while at its apex, after suddenly becoming attenuated it is produced into an enormous flagellum equalling in length the whole genital apparatus and slightly swollen at the extremity. The appendix proper, near its contracted portion, is covered internally with a mucous membrane, invested with an epithelium. A little below this a powerful retractor muscle is attached. From various considerations Jacobi comes to the astounding conclusion that this organ is homologous to a *second penis*. While admitting that cases of duplication of the sexual organs are unknown in Mollusca, he refers to the presence of a double penis in many snakes! A far more rational interpretation of this organ is provided by Dr. Simroth, in a footnote on page 82 of Jacobi's paper, where he suggests that it is a dart sac with dart glands and retractor muscle, but without dart, as it is known to occur in *Urocyclus* and *Parmarion*.

The Indian species of *Ena* have a somewhat remarkable distribution and those referred to the subgenera *Subzebrinus* and *Serina* at least must, I think, be regarded as immigrants from the Palæarctic region; the former, numbering eighteen species, show a close affinity with Afghan, Turkestan, and Tibetan forms, while the latter, comprising only five species, are probably more nearly related to Chinese members of the group. Both subgenera are confined to the north-western portion of India. The subgenus *Mirus*, on the other hand, has three species in Ceylon, and two occurring both in Southern India and Assam, one of the latter having also been recorded from the Shan States, while only two have been described from North-Western India. To judge from its distribution this subgenus must therefore be regarded as endemic.

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* Journ. Coll. Sci., Tokyo, xii, 1898, p. 76.

None of the Indian species appears to have had its anatomy investigated and their reference to these three subgenera is, therefore, based purely on conchological grounds.

It is somewhat surprising to find that many continental malacologists continue to use the name *Buliminus* for the genus in spite of the fact that as far back as 1903 Mr. B. B. Woodward had pointed out * that this name is preoccupied and that *Ena* must be adopted in its stead. The only exception to this, to my knowledge, appears to be Dr. J. Thiele. Kobelt in 1900 and Möllendorff in 1902, indeed, have already used the name *Ena* but only in its restricted sense, *i. e.* for the group of *montanus* for which in 1850 Albers proposed *Merdigerus*.

Sugenus MIRUS, *Albers.*

Mirus, Albers, Die Heliceen, 1850, p. 184 (as section of *Bulimus*); Adams, Gen. Rec. Moll. ii, 1855, p. 165; Chenu, Man. Conchyl. i, 1860, p. 442 (as subgenus of *Chondrus*); Möllendorff, Ann. Mus. Zool. St. Petersburg, vi, 1902, p. 314; Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 55 (as subgenus of *Buliminus*).

Type, *Bulimus cantori*, Philippi.

Range. Central Asia, India, China.

Shell rimately perforate, subcylindrical, or convexly-cylindrical, last whorl anteriorly slightly ascending; columella arcuate, aperture ovate; peristome expanded, callused within, the margins, united by a more or less thick callus, with or without a denticle near the upper margin.

Anatomy unknown.

199. Ena ceratina, *Reeve.*

Bulimus ceratinus (Benson), Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 77, fig. 569; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 352; ibid., Conch.-Cab., *Bulimus*, 1853, p. 77, pl. 21, figs. 6, 7.

Bulimus (*Ena*) *ceratinus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 153.

Bulimus cœlebs, var. *ceratina*, Hanley & Theobald, Conch. Ind. 1874, pl. 80, fig. 2.

Buliminus (*Petracus*) *coelebs*, var. *ceratina*, Nevill, Hand List, i, 1878, p. 134.

Bulimina (*Ena*) *ceratina*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 289.

Original description:—"Shell acuminately oblong, thin, compressly umbilicated, whorls six to seven in number, convex, somewhat obscurely irregularly striated in a grooved manner, columella broadly vertically reflected, aperture rather small, nearly orbicular; transparent horny." (*Reeve.*)

Long. 14, diam. 7 mm. (*ex icon.*).

* Journ. Conchol. x, 1903, p. 358.

Hab. India: Almorah, Kumaon, N.W. Prov. (*Boys*).

This species is allied to *E. nilagirica*, Pfeiffer, but is considerably smaller in size with a more conoid spire and a smaller aperture. The Theobald collection comprises specimens measuring 14 × 5·5 mm. and 12·5 × 6·25 mm., the former being marked with transverse hydrophanous streaks.

200. Ena nilagirica, *Pfeiffer.*

Bulimus nilagiricus, Pfeiffer, P. Z. S. 1846, p. 41; ibid., Mon. Helic. Viv. ii, 1848, p. 119; Reeve, Conch. Icon. v, 1848, *Bulimus*, pl. 46, fig. 291 (*nilagaricus*); Blanford, J. A. S. B. xxxv, 1866, p. 38; ibid., xxxix, 1870, p. 24; Theobald, tom. cit. p. 395; Godwin-Austen, J. A. S. B. xlv, 1876, p. 317.

Bulimulus (*Ena*) *nilagiricus*, Adams, Gen. Rec. Moll. ii, 1855, p. 160.

Bulimus (*Ena*) *nilagiricus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 153.

Buliminus (*Petraeus*) *nilagiricus*, Nevill, Hand List, i, 1878, p. 135.

Bulimina (*Ena*) *nilagirica*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 291.

Buliminus (*Subzebrinus*) *nilagiricus*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 950, pl. 133, fig. 5.

Original description:—"Bul. testa rimato-perforata, oblongo-turrita, solida, opaca, lineis impressis confertissimis subundulatis obsolete sculpta, fusca, albido oblique strigata; spira regulariter turrita, apice obtusiusculo; anfractibus 8 vix convexiusculis, ultimo $\frac{1}{3}$ longitudinis subæquante, basi subcompresso; apertura ovali; peristomate expanso, late albo-labiato, margine dextro superne subangulato, columellari usque ad basin dilatato, patente.

"Long. 28½, [?] diam. 8 mm." (*Pfeiffer.*)

Hab. India: Nilgiris, Anamullays (*Blanford*); Khasi Hills, Dafla Hills (*Godwin-Austen*); Shan States (*Theobald*); Pulney Hills (*Fairbank*).

Nevill, in Hand List, i, p. 135, enumerates, but does not describe, two varieties—*elongata* and *pulneyana*.

The shell figured as *nilagiricus* in Conch. Ind. does not pertain to Pfeiffer's species and has been separated by Kobelt as *B. hanleyanus.*

The length indicated by Pfeiffer in the original description—28½ mm.—is probably a misprint for 18½, since of three specimens from the Cuming collection, mounted on a tablet which bears a label in Pfeiffer's writing, two measure 19·5 × 8 mm. and the third is 17·5 mm. long with a diameter of 6 mm. They are marked with some transverse, whitish, diaphanous streaks and bear very close, incised, wavy spirals, two features not mentioned in the diagnosis. In the Beddome collection are some shells ranging from 16·25 × 6·25 to 15 × 6 mm.

E. nilagirica differs from *E. ceratina* in having a more slender spire, and a greater number of whorls; the aperture is less dilated, and the upper and outer margins of the peristome are less curved.

201. **Ena proletaria**, *Pfeiffer.*

Bulimus proletarius, Pfeiffer, P. Z. S. 1854, p. 292; ibid., Mon. Helic. Viv. iv, 1859, p. 417; Hanley & Theobald, Conch. Ind. 1874, pl. 80, fig. 3.
Bulimus (Ena) proletarius, Pfeiffer, Malak. Blätt. ii, 1856, p. 153.
Bulimus (Ena) proletarius, Nevill, Enum. Helic. Ceylon, 1871, p. 3.
Buliminus (Petraeus) proletarius, Nevill, Hand List, i, 1878, p. 135.
Bnlimina (Ena) proletaria, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 289.
Ena proletaria, Jousseaume, Mém. Soc. Zool. France, iv, 1894, p. 297.
Buliminus (Ena) proletarius, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 673, pl. 102, fig. 16.

Original description :—" B. testa compresse umbilicata, oblongo-turrita, solidula, sublente minutissime granulata, nitidula, corneo-fusca; spira elongata, obtusula; anfract. 7, convexis, ultimo $\frac{1}{3}$ longitudinis vix superante, antice subascendente, basi subcompresso; apertura vix obliqua, oblonga; perist. albo-labiata, marginibus approximatis, dextro expanso, superne perarcuato, columellari dilatato, patente.

" Long. 15, diam. 6 mill." (*Benson.*)

Hab. Ceylon: Matelle East (*Layard*); Bintenne (*Coll. Ponsonby*).

E. proletaria is allied to *E. nilagirica* and *E. hanleyana*, but has the whorls more tumid than either, the spire is less convex and the spiral lines are a little coarser and not quite so close. The single specimen I have seen is in the Cuming collection, in all probability the type.

202. **Ena hanleyana**, *Kobelt.*

Bulimus nilagiricus, Hanley & Theobald, Conch. Ind. 1870, pl. 23, fig. 3 (not *B. nilagiricus*, Pfeiffer); Möllendorff coll., ex Beddome.
Buliminus (Ena) hanleyanus, Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 931, pl. 131, figs. 3–5.

Original description :—" Testa rimato-perforata, ovato-conica, solidula, sat ruditer oblique striata vel costellato-striata, obsoletissime granulata, haud nitida, sub-epidermide fusca decidua albido-cornea. Spira conica, lateribus vix convexiusculis, apice obtuso, lævi, nitido. Anfractus 7–7½ convexiusculi, sutura impressa inter inferos subcrenulata discreti, ultimus postice $\frac{2}{5}$ altitudinis parum superans, basi rotundatus, subcompressus, antice ascendens. Apertura irregulariter ovata, alata, intus albido-cornea; peristoma acutum, expansum sed haud reflexum, marginibus subparallelis, distantibus, haud junctis, externo supra tantum oblique versus

axin protracto, dein vix arcuato, basali cum columellari brevi triangulari patente, intus obsolete plicifero angulum formante.

"Alt. 15·5, diam. 7·5, alt. ap. 6, lat. 5 mill." (*Kobelt.*)

Hab. India: Nilgiris (*Beddome*).

This species is based upon specimens in the Möllendorff collection, received as *E. nilagirica* from the late Col. Beddome. The figure in Conch. Ind., supposed to represent that species, and copied by Kobelt, is also referred to it. In looking through the Beddome collection, by kind permission of Mr. Leman its present owner, I found a box with several specimens labelled *nilagirica*, seven of which agree with *hanleyana* and range in size between 14 × 7 and 12·25 × 7 mm. The Theobald collection also yielded two shells of this form from the *Nilgiris*, the larger measuring 15 × 6·5 and the smaller 13·75 × 5 mm.

E. hanleyana differs from *nilagirica* principally in the shorter spire and broader base, the fewer whorls, and relatively larger aperture; the umbilicus is also more open, but it agrees in being similarly provided with close incised spirals, more or less obsolete in places.

203. **Ena stalix**, *Benson.*

Bulimus stalix, Benson, A. M. N. H. ser. 3, xi, 1863, p. 322; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 61; Hanley & Theobald, Conch. Ind. 1870, pl. 22, fig. 3.

Bulimus (Ena) stalix, Nevill, Enum. Helic. Ceylon, 1871, p. 3.

Buliminus (Petraeus) stalix, Nevill, Hand List, i, 1878, p. 135.

Bulimina (Ena) stalix, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 289.

Ena stalix, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 297.

Buliminus (Ena) stalix, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 673, pl. 102, fig. 15.

Buliminus (Subzebrinus) stalix, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 49.

Original description:—"B. testa rimato-perforata, oblongo-conica, solidiuscula, oblique irregulariter plicatulato-striata, epidermide spiraliter confertissime striulata, castanea, strigis obliquis, sutura, basi apiceque albidis; spira elongato-conica, apice obtusiusculo, sutura impressiuscula, nonnunquam marginata; anfractibus 7, convexiusculis, ultimo ad basin compressiusculo, antice vix ascendente; apertura subobliqua, anguste pyriformi, intus castanea, peristomate sensim dilatato, vix reflexiusculo, albido, marginibus remotis, non conniventibus, columellari lato, callo obliquo superne castaneo junctis.

"Long. 20, diam. 7 mill." (*Benson.*)

Hab. Ceylon: Upper Ourah (*F. Layard*); Nuwara Eliya (*Simon*); Borlande (*Theobald*); Uva, 6000 feet (*coll. Ponsonby*).

Another form of the group of *E. nilagirica*, but the shell is smaller than that species and the sculpture much coarser. In the

Theobald collection is a shell taken at Borlande, Ceylon, which agrees with the figure in Conch. Ind. and is probably the one from which the illustration was made.

204. Ena vicaria, *Blanford*.

Bulimus vicarius, Blanford, J. A. S. B. xxxix, 1870, p. 18, pl. 3, fig. 15; Theobald, tom. cit. p. 395; Hanley & Theobald, Conch. Ind. 1872, pl. 22, fig. 2; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 87.

Buliminus (*Petraeus*) *vicarius*, Nevill, Hand List, i, 1878, p. 135.

Bulimina (*Ena*) *vicaria*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 291.

Buliminus (*Napaeus*) *vicarius*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1899, p. 566, pl. 88, figs. 22, 23.

Buliminus (*Subzebrinus*) *vicarius*, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 49.

Original description:—"Testa profunde rimata, oblongo-turrita, tenuiuscula, opaca, fulvescente-castanea, oblique striatula, lineis minutis confertissimis flexuosis subobsolete decussata; spira turrita, lateribus convexis; apice obtuso; sutura impressa. Anfr. 8 convexi, ultimus $\frac{1}{3}$ longitudinis sub-æquans, basi subcompressus, antice sub-ascendens. Apertura fere verticalis, truncato-ovalis; peristoma undique expansum, album, marginibus convergentibus callo tenui junctis, columellari verticali.

"Long. 15, diam. 5, apert. cum perist. 5, longa, 4 lata." (*Blanford*.)

Hab. India: Habiang, Garo Hills and Khasi Hills, Assam (*Godwin-Austen*).

"The nearest ally to this shell is *B. nilagaricus*, Pfr., which, singularly enough, also occurs in the Khasi Hills, having been found by Major Godwin-Austen. The present form is distinguished by greater slenderness and smaller mouth." (*Blanford*.)

Its nearest ally I consider *E. stalix*, from which it may be distinguished by the more contracted last whorl and the very fine sculpture. In the Theobald collection are two shells, one from Naini Tal, and the other from the Shan States, without precise indication of locality.

205. Ena panos, *Benson*.

Bulimus panos, Benson, A. M. N. H. ser. 2, xii, 1853, p. 94; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 417.

Bulimus (*Ena*) *panos*, Pfeiffer, Malak. Blätt, ii, 1856, p. 153; Nevill, Enum. Helic. Ceylon, 1871, p. 3.

Buliminus (*Petræus*) *proletarius* var. *panos*, Nevill, Hand List, i, 1878, p. 135.

Bulimina (*Ena*) *panos*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 289.

Ena panos, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 297.

Original description:—"Testa rimata, ovato-oblonga, subrugose striata, cornea, spira elongato-conica, sutura mediocri, apice

obtuso; anfractibus $6\frac{1}{2}$ convexiusculis, ultimo $\frac{2}{5}$ long, æquante, antice sub-ascendente, apertura ovata, edentula; peristomate

Fig. 87.—*Ena panos.* $\frac{3}{2}$.

expansiusculo, acuto, marginibus conniventibus, columellari breviter dilatato, albido.

"Long. 11, diam. 5 mill." (*Benson.*)

Hab. Ceylon: Nalande (*Layard*); Ceylon (*Nevill*).

Appears like a small form of *E. proletaria*, but the base is not so broad as in that species. I have only seen a single specimen, which is in the Theobald collection and is from Nalande, the type locality; as the species has not hitherto been illustrated I take the opportunity of giving two views of this shell.

206. **Ena smithei**, *Benson.*

Bulimus smithei, Benson, A. M. N. H. ser. 3, xv, 1865, p. 15; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 56; Hanley & Theobald, Conch. Ind. 1870, pl. 20, fig. 3.
Napæus smithii, Theobald, J. A. S. B. xlvii, 1878, p. 146.
Napæus smithei, Theobald, op. cit. l, 1881, p. 48.
Buliminus (Petraeus) smithei, Nevill, Hand List, i, 1878, p. 135.
Bulimina (Ena) smithei, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 288.
Buliminus (Ena) smithi, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 682, pl. 103, fig. 10.
Buliminus (Subzebrinus) smithei, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 49.

Original description:—"Testa perforata, ovato-oblonga, irregulariter rugoso-striata, striis tenuibus plus minusve decussata, sub epidermide cornea albida, non nitente; spira oblongo-turrita lateribus convexiusculis; apice obtusiusculo, sutura impressa; anfractibus $7\frac{1}{2}$, convexiusculis, ultimo antice leviter ascendente; apertura vix obliqua, subovata, peristomate tenui reflexiusculo, marginibus callo tenui junctis, columellari perforationem subtegente.

"Long. 13, diam. 5, apert. long. 4, lat. $3\frac{1}{2}$ mill." (*Benson.*)

Hab. India: Hills on right side of the river Sutlej, Punjab (*Smithe*); Fagoo (*Theobald*); Naini Tal (*Stoliczka*); Jhilum Valley, Kashmir and Mari [Murree], Punjab (*Theobald*).

The present species is related to *E. vicaria*, but it is more cylindrical in contour, with less convex spire and more contracted

aperture, owing to the right margin of the peristome being more inflexed.

A single shell in the Theobald collection, from the N.W. Himalayas, is probably the one on which the figure in Conch. Ind. is based.

Subgenus **SUBZEBRINUS**, *Westerlund.*

Subzebrinus, Westerlund, Fauna Palaärct. iii, 1887, p. 66 (as section of *Buliminus*); Möllendorff, Ann. Mus. Zool. St. Petersburg, vi, 1902, p. 327 (as subgenus of *Buliminus*); Wiegmann, tom. cit. p. 241 (anatomy); Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 47.

Type: (first species) *Bulimus eremitus*, Reeve.

Range. Central Asia, India, China, Japan.

Shell subcylindrical, whitish, generally transversely streaked with pale brown; margins of peristome united by a more or less strong callus, with or without a denticle near the upper margin.

Jaw aulacognathous, distinctly dilated towards the sides.

Radula with 61–89 teeth, corresponding in most species to the formula $\frac{C}{1\text{-}3\ \text{obsol.}} + \frac{L}{1\text{-}3\ \text{obsol.}}$, but in a few to $\frac{C+L}{1}$.

Genitalia: the spermatheca duct, including the diverticulum, after separating from the ovisperm duct, which is contiguous to both, reaches far beyond the albumen gland, frequently being twice, in some cases three times, the combined length of the albumen gland and ovisperm duct.

The neck of the uterus, which in the genus usually exceeds the vagina in length, is here practically twice as long, in one case (*B. melinostoma*) more than three times its length. *B. dolichostoma*, in which, on the contrary, the vagina is about one-third longer than the neck of the uterus, is an exception in this respect. The penis is moderately long, attaining only from two-thirds to three-quarters of the length of the spermatheca duct and diverticulum. The appendix is somewhat longer than the penis and reaches beyond the albumen gland. In one species, however (*B. melinostoma*), the appendix is about one-third shorter than the penis, agreeing in this respect with the section *Pupinidius*. As compared with the ovisperm duct, including the albumen gland, the appendix is from $1\frac{1}{3}$ to $2\frac{1}{4}$ times as long. A rudimentary cæcum, situate about the middle of the penis, appears as a diminutive tubercle. In one species (*B. melinostoma*) it is wanting. (*Wiegmann.*)

207. **Ena vibex**, *Küster.*

Bulimus vibex (Hutton), Küster, Conch.-Cab., *Bulimus*, 1845, p. 57, pl. 17, figs. 5, 6; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 118; Reeve, Conch. Icon. v, 1848, *Buliminus*, pl. 47, fig. 299; Hanley & Theobald, Conch. Ind. 1870, pl. 20, fig. 5 (? var.), pl. 22, fig. 8 (var.), pl. 23, fig. 2.

Bulimulus (*Ena*) *vibex*, Adams, Gen. Rec. Moll. ii, 1855, p. 161.

Bulimus (Ena) vibex, Pfeiffer, Malak. Blätt. ii, 1856, p. 154.
Buliminus (Napaeus) vibex, von Martens, Die Heliceen, ed. 2, 1860, p. 234.
Buliminus (Petraeus) vibex, Nevill, Hand List, i, 1878, p. 136.
Bulimina (Ena) vibex, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 291.
Buliminus (Ena) vibex, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 683, pl. 103, figs. 11–13.
Buliminus (Subzebrinus) vibex, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 49.

Original description:—"B. testa sinistrorsa, rimato-perforata, ovato-cylindracea, apice attenuata, tenuiuscula, oblique striata, livido-cornea, anfractibus 8 vix convexiusculis, angustis; sutura profunda; apertura rotundato-trigona, oblique truncata, intus flavida; peristomate sublabiato, reflexo, plumbeo, margine acuto; columellari dilatato." (*Küster*.)

"Long. 11, diam. medio $4\frac{1}{2}$ mill., ap. $3\frac{2}{3}$ mill. longa, intus 2 lata." (*Pfeiffer*.)

Hab. India: Simla (*Hutton*, *Stoliczka*), Landour (*Benson*), Mussoorie (*Nevill*).

A series of twenty-seven specimens of *E. vibex* in the British Museum from Simla, received from Hutton, range in size from 12×4·5 mm. to 11×4 mm., while a specimen in the Cuming collection, without habitat, measures: length 16, diam. 5·5 mm.

Fig. 88.—*Ena vibex*. $\frac{3}{2}$.

The shell here figured is one of a batch from Landour, acquired by purchase in 1848 by the British Museum, and measures 11·5×3·5 mm.

E. vibex, *E. linteræ*, *E. boysiana*, *E. arcuata*, *E. nivicola*, and *E. huttoni* form a rather homogeneous group in the genus, characterized by the opaque white transverse streaks on a dark corneous or fuscous ground, the sinistral convolutions, and the comparatively short stature, none of the species exceeding 20 mm. in length. As regards contour, *E. vibex* and *E. nivicola* are the two extremes of the series, the former being the most cylindrical and the latter the most ventricose in outline.

208. **Ena linteræ**, *Kobelt*.

Buliminus (Napaeus) linterae, Kobelt, Conch.-Cab., Fam. Buliminidae, 1899, p. 560, pl. 88, figs. 6, 7.
Buliminus (Subzebrinus) linterae, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 48.

Original description:—"Testa sinistrorsa, profunde rimata, cylindracea, ruditer subobliqne striatula vel striato costata, griseoalba, in anfractibus superis corneo obsolete strigata, summo rufocornea. Spira supra conico-attenuata, apice acutiusculo. Anfractus 9 vix convexiusculi, leniter ac regulariter crescentes, sutura impressa, inter inferos submarginata discreti, ultimus basi rotundatus, postice altitudinis $\frac{1}{3}$ vix superans, antice vix ascendens. Apertura subsemicircularis, albida; peristoma album, undique expansum, acutum, tenue, tenuissime labiatum, marginibus haud junctis, columellari parum dilatato, patente, cum pariete aperturali angulum distincte formante.

"Alt. 10. diam. anfr. ult. 7·5, alt. apert. 6·5 mm." (*Kobelt.*)

Hab. ? Northern India.

The specimens on which the species is based were sent to Dr. Kobelt by the late Miss Linter as *B. arcuatus*, var., but the form is evidently nearer to *E. vibex*, from which it differs by its more slender, more cylindrical shape and the more distinct sculpture; the markings are also more distinct and the aperture is proportionately larger and wider. The Theobald collection in the British Museum contains three specimens from Mahasu, which I refer to *E. linteræ*; they range in size from 15·5 × 6·5 to 20 × 8 mm.

209. **Ena boysiana**, *Reeve.*

Bulimus boysianus (Benson), Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 78, fig. 575; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 432; ibid., Conch.-Cab., *Bulimus*, 1853, p. 69, pl. 20, figs. 9, 10; Hanley & Theobald, Conch. Ind. 1872, pl. 22, fig. 6.

Bulimus (Bulimulus) boysianus, Pfeiffer, Malak. Blätt. ii, 1856, p. 161.

Buliminus (Petraeus) boysianus, Nevill, Hand List, i, 1878, p. 136.

Bulimina (Chondrula) boysiana, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 296.

Buliminus boysianus, Westerlund, Fauna Palaärct. Binnenconchyl. iii, 1887, p. 74; ibid., Syn. Moll. Extramar. Reg. Palæarct. i, 1897, p. 13.

Buliminus (Chondrulopsis) boysianus, Westerlund, Katal. Palaärct. Binnenconch. 1890, p. 92.

Buliminus (Subzebrinus) boysianus, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 47.

Original description:—"Shell cylindrically oblong, sinistral, scarcely umbilicated, whorls eight in number, convex, rather coarsely striated, very finely plicated at the sutures, minutely decussated beneath the lens with spiral lines; horny brown, variegated with waved opake-white lines." (*Reeve.*)

Length 19, diam. 8 mm. (*ex icon.*).

Hab. India: Kumaon, W. Himalayas (*Boys*); Naini Tal (*Stoliczka, Nevill*); Darjeeling (*coll. Ponsonby*).

I have not seen specimens; the type, like so many of Benson's, has apparently gone astray. Judging from the figures the species

is intermediate between *E. arcuata* and *E. vibex*, being less convex in outline than the former, while the latter is more fusiform. The shell figured by Reeve, which must be regarded as the type, is larger than the specimens represented in Conch. Ind. and Conch.-Cab., which measure only 17 × 7 mm.

210. Ena arcuata, *Küster*.

Bulimus arcuatus (Hutton), Küster, Conch.-Cab., *Bulimus*, 1845, p. 56, pl. 17, figs. 1, 2; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 118; Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 67, fig. 478; Hanley & Theobald, Conch. Ind. 1870, pl. 20, fig. 2; var., fig. 7.
Bulimulus (*Ena*) *arcuatus*, Adams, Gen. Rec. Moll. ii, 1855, p. 160.
Bulimus (*Ena*) *arcuatus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 154.
Buliminus (*Napaeus*) *arcuatus*, von Martens, Die Heliceen, ed. 2, 1860, p. 234.
Napæus arcuatus, Theobald, J. A. S. B. xlvii, 1878, p. 145.
Buliminus (*Petraeus*) *arcuatus*, Nevill, Hand List, i, 1878, p. 136.
Bulimina (*Ena*) *arcuata*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 291.
Buliminus (*Ena*) *arcuatus*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 684, pl. 103, figs. 14, 15.
Buliminus (*Subzebrinus*) *arcuatus*, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 47.

Original description:—"B. testa sinistrorsa, rimata, ovato-conica, tenuiuscula, subnitida, minutissime costulato-striata, corneo-flava, lutescenti-arcuatim fasciata; anfractibus 7 convexiusculis; apertura oblongo-ovali, intus flava; peristomate pallide-corneo, margine sinistro arcuato, columellari breviter dilatato." (*Küster.*)

Length 15 mm.; diam. 6 mm. (*Pfeiffer.*)

Hab. India: Himalayas (*v. d. Busch*); Mahassu, W. Himalayas (*Hutton*); Kashmir (*Theobald*); Simla and Narkandi (*Oldham, Stoliczka*).

Fig. 89.—*Ena arcuata*. $\frac{3}{2}$.

Kobelt gives a poor copy of the figure in Conch. Ind., representing *E. nivicola*, which is supposed to be cospecific with *arcuata*, but which is certainly distinct. Pfeiffer and Clessin quote *Pupa sylvatica*, of Hutton, as a variety of *arcuata*, with *Bulimus nivicola* as a synonym. The habitat "Moulmain" given in Conch. Ind., Theobald points out, is an error. *Ena arcuata*

has a more convex spire than *E. vibex*, and the body-whorl is proportionately larger. From *E. nivicola*, on the other hand, it may be distinguished by its less globose form; it is, in fact, intermediate between these two species. Although the latter has been regarded by some authors as merely a variety of *arcuata*, I consider them quite distinct. Of the two first-named considerable series have passed through my hand, and I have never hesitated to which form to refer them.

The specimen here figured is one of three in the Cuming collection labelled "India"; it measures 13·25 × 5 mm.

The name *arcuata* has a rather peculiar history. A tablet in the British Museum, with twenty-six specimens received from Hutton in 1856, bears on its back the following legend, apparently copied from Hutton's letter or label:—"Pfeiffer mistook *ornatus* for *arcuatus*. *Ornatus* being preoccupied I changed it to *sylvaticus*, but the mischief is done." This accounts for the fact that Pfeiffer quotes *Pupa sylvatica* as a synonym. The largest of this series measures 16 × 7 mm. and the smallest 12 × 5·25 mm. Another shell in the British Museum, from Simla, measures 17·5 × 8·25 mm., while four specimens from Mukraj, Salt Range, which I also refer to the present species, are rather different from all I have seen, being of a chalky white, with pale corneous transverse streaks; these range in size between 18 × 7·5 mm. and 16 × 6·25 mm.

211. **Ena nivicola**, *Reeve.*

Bulimus nivicola (Benson), Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 69, fig. 496; Hanley & Theobald, Conch. Ind. 1870, pl. 22, fig. 9.

Bulimina (*Ena*) *arcuata*, var. *sylvatica* (=*nivicola*), Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 291.

Original description:—"Shell cylindrically ovate, stout, ventricose, sinistral, compressly umbilicated, whorls seven in number, convex, obliquely striated, somewhat obscurely crenulated at the sutures, columella rather broad, appressed, aperture small, lip slightly expanded; red-brown, marked here and there with irregularly interrupted oblique white streaks, covered with a thin yellowish epidermis." (*Reeve.*)

Length 11, diam. 5·75 mm. (*ex icon.*).

Hab. India: Liti Pass, W. Himalayas, 14,000 feet (*Hutton*).

"Mr. Benson is of opinion that this species, distinguished by its stout cylindrical form and reversed growth, which has been upwards of twelve years in his collection, is the *Pupa sylvatica* of Hutton, described in M'Clelland's Journal for January 1841, as being found among juniper bushes at Burrenda Pass, and of which the name is preoccupied in the present genus to which this species strictly belongs. It is remarkable for its stout cylindrical form and reversed growth." (*Reeve.*)

After some considerable search I have succeeded in tracing Hutton's name *Pupa sylvatica*, referred to by Reeve when describing and illustrating *Ena nivicola*, and by Pfeiffer*, both on the authority of Benson, neither having seen the original. The complete reference is as follows:—Calcutta Journal of Natural History (Edited by McClelland), i, 1841, p. 479. No question of priority, however, is involved, since no description is given by Hutton; but on account of Reeve's misleading statement—"*Pupa sylvatica* of Hutton, 'described' in M'Clelland's Journal for January 1841"—I have thought it useful to place this fact on record.

Fig. 90.—*Ena nivicola*. $\frac{3}{2}$.

E. nivicola is the most ventricose member of the group. The British Museum possesses six specimens received from Hutton and labelled "Snowy Range." Some of these exceed the type in their dimensions, ranging in size from 11·5 × 6·5 mm. to 12 × 6 and 14 × 7 mm.

The shell here figured is one of six from the Snowy Range received by the British Museum from Hutton in 1856.

212. **Ena huttoni**, *Pfeiffer*.

Bulimus cylindricus (Hutton), Küster, Conch.-Cab., *Bulimus*, 1845 explanation of plate on cover, pl. 17, figs. 3, 4 (not *Bulimus cylindricus*, Gray, 1825, not *Bulimus cylindricus*, Menke, 1830).
Bulimus huttoni, Pfeiffer, Symb. Hist. Helic. iii, 1846, p. 55, nom mut.; ibid., Mon. Helic. Viv. ii, 1848, p. 118; Küster, Conch.-Cab., *Bulimus*, 1853, p. 57.
Bulimus (*Ena*) *huttoni*, Pfeiffer, Malak. Blätt. ii, 1856, p. 154.
Buliminus (*Subzebrinus*) *huttoni*, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 48.

Original description:—"T. sinistrorsa, rimato-perforata, oblongo-conica, oblique ruguloso-striata, cornea; spira oblonga, apice attenuata, obtusiuscula; anfr. 7 convexiusculi, ultimus $\frac{2}{5}$ longitudinis subæquans; columella arcuata; apertura ovalis, intus fulvescens; perist. vix sublabiatum, margine exteriore vix expansiusculo, flexuosa, columellari dilatato, reflexo.

"Long. 15, diam. 6 mill. Ap. 6 mill. longa, 3 lata." (*Pfeiffer*.)
Hab. India.

* Mon. Helic. Viv. iii, 1853, p. 350.

Intermediate between *E. vibex* and *E. arcuata*, being more convex in the spire than the former and more cylindrical than the latter.

213. **Ena eous**, *Reeve.*

Bulimus eous, Reeve, Conch. Icon. v, 1850, *Bulimus*, pl. 86*, fig. 640; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 361.
Bulimina (Petraeus) coa, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 287.
Buliminus (?) *eous*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 951, pl. 133, fig. 6.

Original description:—"Shell cylindrically oblong, rather stout, compressly umbilicated, whorls six in number, convexly flattened, columella vertical, broadly dilated, aperture nearly orbicular, produced, margins joined together by a lamina; white." (*Reeve.*)

Long. 28, diam. 13 mm. (*ex icon.*).

Hab. India (*Griffiths*).

Said by Reeve to be allied to *B. griffithi*, but the figure does not exhibit much resemblance to that species, being much shorter in the spire and having a much less dilated aperture. I have not seen specimens, having failed in tracing the type.

214. **Ena kunawurensis**, *Reeve.*

Bulimus kunawurensis (Hutton), Reeve, Conch. Icon. v. 1849, *Bulimus*, pl. 62, fig. 426; Pfeiffer, Mon. Helic. Viv. iii. 1853, p. 349; ibid., Conch.-Cab., *Bulimus*, 1853, p. 68, pl. 20, figs. 3, 4; Hanley & Theobald, Conch. Ind. 1870, pl. 19, fig. 3.
Bulimulus (Ena) kunawurensis, Adams, Gen. Rec. Moll. ii, 1855, p. 160.
Bulimus (Ena) kunawurensis, Pfeiffer, Malak. Blätt. ii, 1856, p. 154.
Buliminus (Petraeus) kunawurensis, Nevill, Hand List, i, 1878, p. 136.
Bulimina (Zebrina) kunawurensis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 294.
Buliminus kunawurensis, Westerlund, Fauna Paläarct. Binnenconchyl. iii, 1887, p. 73; ibid., Syn. Moll. Extramar. Reg. Palæarct. i, 1897, p. 12; ibid., Katal. Paläarct. Binnenconch. 1890, p. 92.
Buliminus (Subzebrinus) kunawurensis, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 48.

Original description:—"Shell elongately turreted, sinistral, compressly umbilicated, whorls twelve in number, smooth or obscurely roughly striated, minutely crenulated at the sutures, aperture small, lip and columella expanded; brownish horny colour, marked here and there with opake white streaks, lip snow-white within." (*Reeve.*)

Long. 36, diam. 9 mm. (*ex icon.*).

"Long. 34, diam. 7½ mill. Ap. 8 mill. longa, intus 4 lata." (*Pfeiffer.*)

* The text accompanying plate 86 is marked 76 owing to a printer's error.

Hab. Tibet: Chini, Kunawur; banks of the Sutlej (*Hutton*). India: Landour, W. Himalayas (*Theobald*).

The species varies considerably in length. The type, according to Reeve's figure, measures 36 mm., the shell illustrated by Hanley & Theobald being 31 mm. long, while a specimen from Chini in the Theobald collection only reaches 27·5 mm. in length, with a diameter of 7·5 mm. Hutton's five specimens from Kunawur, in the British Museum, range from 31 × 9 to 28 × 7 mm. Two shells in the Cuming collection are fulvous-corneous, strongly streaked transversely with greyish white.

E. kunawurensis has the earlier whorls very finely spirally striated, the spirals becoming obsolete on the later whorls. From *E. candelaris* it may be separated by its more cylindrical shape and the smaller aperture; it also has the peristome less thickened, with acute edges, and the outer margin is less curved.

A small specimen from Kunawar, received by the British Museum from Hutton, approaches *E. sindica* in form, but that species is more tapering towards the apex.

215. Ena candelaris, *Pfeiffer*.

Bulimus candelaris, Pfeiffer, P. Z. S. 1846, p. 40; ibid., Mon. Helic. Viv. ii, 1848, p. 127; Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 60, fig. 408; Hanley & Theobald, Conch. Ind. 1872, pl. 19, fig. 2.

Bulimulus candelaris, Adams, Gen. Rec. Moll. ii, 1855, p. 159.

Bulimus (*Ena*) *candelaris*, Pfeiffer, Malak. Blätt. ii, 1856, p. 152.

Buliminus candelaris, von Martens, Malak. Blätt. xv, 1868, p. 160; Ancey, Bull. Soc. Malac. France, iii, 1886, p. 19; Westerlund, Fauna Paläarct. Binnenconchyl. iii, 1887, p. 74; Ancey, Bull. Soc. Zool. France, xviii, 1893, p. 42; Westerlund, Syn. Moll. Extramar. Reg. Palæarct. i, 1897, p. 12; ibid., Katal. Paläarct. Binnenconch. 1890, p. 92.

Napæus candelaris, Theobald, J. A. S. B. xlvii, 1878, p. 144.

Buliminus (*Petraeus*) *candelaris*, Nevill, Hand List, i, 1878, p. 136.

Bulimina (*Petraeus*) *candelaris*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 288.

Buliminus (*Napacus*) *candelaris*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1899, p. 561, pl. 88, figs. 8–12; ibid., in Rossmässler, Iconogr., N. F. ix, 1899, p. 21, figs. 1604–5.

Buliminus (*Subzebrinus*) *candelaris*, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 47.

Original description:—"Bul. testa sinistrorsa, profunde rimata, cylindracea, apice sensim attenuata, acutiusculo, suboblique striatulo, sordide albo; anfractibus 9 planiusculis, ultimo minus oblique descendente, $\frac{1}{3}$ longitudinis vix æquante, basi subrotundato; apertura semiovali, intus nitida, alba; peristomate albo, undique expanso, marginibus callo tenui junctis, columellari dilatato, patente.

"Long. 27, diam. 8 mill." (*Pfeiffer*.)

Hab. India: Fort Lockhart, N.W. India (*Watson*); Jhilum

Valley, above Kokala (*Theobald*); Kashmir (*Atkinson*); Takht-i-Suliman (*Thomson*); Tinali (*Stoliczka*). Tibet (*Pfeiffer*).

When first described by Pfeiffer its habitat was unknown. In 1859, however, he recorded Tibet (Mon. Helic. Viv. iv, p. 426) as its native country, without stating the source of his information. Benson (A. M. N. H. ser. 2, xix, 1857, p. 327) gave Takht-i-Suliman, Kashmir, as habitat, while Theobald (J. A. S. B. 1878, p. 144) mentioned it as common about Mari and in various places in Kashmir, usually above 6000 feet, but occasionally lower. He further states that

"Sinistral shells are most numerous, but dextral ones also occur not rarely. My largest sinistral shell measures 35·6 × 9·2 and my smallest 27·7 × 8·7 mm. The dextral shells are smaller, ranging from 33 × 8·8 to 24 × 8·5 mm. The shells vary somewhat in a large series, in tumidity and in the attenuation of the spire, and even in the number of whorls, a remark which applies to all the species of the genus, and proves the risk of creating new species from single examples.

"I do not think that *N. domina*, B., can be separated, as the main distinction seems to be in the texture of the shell; but in this group the texture varies from horny and sub-diaphanous, in which the striped markings are conspicuous, to creamy porcellanous, in which they are more or less if not wholly obsolete. The difference too in this respect is considerable between the living and dead shells, and largely depends (unless I am much mistaken) on the conditions of climate and alimentation under which the animal lived.

"A slender form is seen in places, with a thinner shell than the type, and indicating a passage to *N. kunawarensis*, Hutton. A typical example of this variety measures 26·5 × 8 mill."

B. candelaris and *B. domina* are, to my mind, two perfectly distinct and valid species, notwithstanding Theobald's observations to the contrary. The latter species, apart from its markings, is much more convex in outline than the former with its attenuated spire. It is, of course, possible that Theobald had not seen the true *domina*.

The Theobald collection in the British Museum contains even smaller sinistral specimens than those referred to by Theobald; they measure 21·5 × 7·5 mm., and are from the Jhilum Valley above Kokala. Dextral shells from the same locality are also present. Theobald's Kashmir specimens range from 36 × 8·5 mm. to 24 × 8·5, both dextral and sinistral.

Dr. Kobelt records three shells from Northern India, in the Möllendorff collection, measuring 29 mm. in length, and being slightly angulated. He observes that some shells have corneous transverse streaks on the upper whorls, a feature which I have likewise noticed in some specimens.

216. Ena sindica, *Reeve.*

Bulimus sindicus (Benson), Reeve, Conch. Icon. v, 1848, *Bulimus*, pl. 47, fig. 303; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 355; ibid., Conch.-Cab., *Bulimus*, 1853, p. 71, pl. 20, figs. 23, 24; Hanley & Theobald, Conch. Ind. 1870, pl. 20, fig. 6.
Bulimus (*Ena*) *sindicus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 153.
Buliminus (*Petraeus*) *sindicus*, Nevill, Hand List, i, 1878, p. 134.
Napæus sindicus, Theobald, J. A. S. B. xlvii, 1878, p. 145.
Bulimina (*Zebrina*) *sindica*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 294.
Buliminus sindicus, Ancey, Bull. Soc. Malac. France, iii, 1886, p. 49; Ancey, Bull. Soc. Zool. France, xviii, 1893, p. 43; Westerlund, Katal. Paläarct. Binnenconchyl. 1890, p. 92; ibid., Syn. Moll. Extramar. Reg. Palæarct. i, 1897, p. 11.
Buliminus (*Chondrulopsis*) *sindicus*, Westerlund, Fauna Palaärct. Binnenconchyl. iii, 1887, p. 72.
Buliminus (*Ena*) *sindicus*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1901, p. 685, pl. 103, fig. 17 (corrected to *Subzebrinus* on p. 1007) (1902).
Buliminus (*Subzebrinus*) *sindicus*, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 49.

Original description:—"Shell cylindrically elongated, broadly umbilicated, whorls nine in number, flatly convex, smooth or concentrically striated, aperture small, lip and columella expanded, but slightly reflected; greyish white, here and there obliquely marked with pellucid streaks." (*Reeve.*)

Hab. India: near the head-waters of the Sinde (*Benson*); Sub-Himalayan Range, left bank of Sutlej (*Hutton*); Darjeeling (*Hanley & Theobald*); Jhilum Valley, Kashmir and Salt Range (*Theobald*); Mandi (*Stoliczka*); Kussial Ghat, Punjab (*Theobald*). Afghanistan: Khyber Pass (*Barr*); Cherat (*Ancey*).

The present species and *E. kunawurensis* are closely related, but whereas the latter is sinistral, *E. sindica* is dextral and has the last whorl proportionately much higher. The Theobald collection contains shells from various localities, those from the hills between the Sutlej and the Jumna being transversely streaked with a rufous tint and constituting a connecting-link with *E. rufistrigata*, but the latter has a more convex spire and its aperture is not so high; they measure 24 × 7·5 mm. Others from the Salt Range vary in dimensions between 21 × 7·5 to 17 × 6·5 mm. A shell from Kussial Ghat, Punjab, measures 19·5 × 6 mm., while two pure white Kashmir specimens attain a length of 32 mm. with a diameter of 10 mm.

217. Ena domina, *Benson.*

Bulimus domina, Benson, A. M. N. H. ser. 2, xix, 1857, p. 327; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 425; Hanley & Theobald, Conch. Ind. 1870, pl. 22, fig. 5.
Buliminus (*Petraeus*) *domina*, Nevill, Hand List, i, 1878, p. 136.

Bulimina (*Zebrina*) *domina*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 294.
Napæus domina, Theobald, J. A. S. B. l, 1881, p. 47.
Buliminus dominus, Westerlund, Fauna Paläarct. Binnenconchyl. iii, 1887, p. 74; ibid., Katal. Paläarct. Binnenconch. 1890, p. 92; ibid., Syn. Moll. Extramar. Reg. Palæarct. i, 1897, p. 13.
Buliminus (?) *domina*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 684, pl. 103, fig. 16.
Buliminus (*Subzebrinus*) *domina*, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 48.

Original description:—"Testa sinistrorsa, rimato-perforata, ovato-cylindrica, oblique striatula, albida, strigis obliquis rufo-corneis picta; spira cylindrica, superne celeriter attenuata, apice acutiusculo; sutura impressa; anfractibus 8 convexiusculis, ultimo $\frac{2}{5}$ testæ vix æquante, basi rotundata; apertura vix obliqua, semiovali; peristomate undique expanso, marginibus conniventibus, callo brevi junctis, sinistro superne arcuato, columellari dilatato.

"Long. 23, diam. 9 mill., long. ap. 9, lat. 6 mill." (*Benson.*)

Hab. India: Kashmir (*Lady Gomm*); Murree, Kashmir (*Theobald*); Tandiani, Hazara, Punjab (*Theobald*).

According to Theobald the present species cannot be separated from *E. candelaris*, Pfeiffer, as he considered the main distinction to be in the texture of the shell. A careful examination of a considerable number of the two species, however, has convinced me that they can be readily distinguished, not by the texture, but by the shape of the shell, *domina* having a much greater diameter in proportion to its length, while it is also much more marked with dark transverse streaks, *candelaris* being generally of a chalky white, only the upper whorls occasionally being variegated in this manner.

The Theobald collection contains dextral forms of *E. domina*, from Tandiani, Hazara, a station at an elevation of 5000 feet, and sinistral specimens from Mari [Murree]. The former range from 29·5 × 9·5 to 26·5 × 9·25 mm., and the latter measure 30·5 × 10 mm. There are besides in the British Museum two shells collected by Major Spratt at Lundi Kotal.

218. **Ena longstaffi**, sp. n.

Shell moderately umbilicated, fusiform-pyramidal, white, shining, distantly and irregularly striated, the striæ crossed by obsolete spirals. Whorls 9, the protoconch—consisting of 2 whorls—smooth and polished, rather convex, the remainder more flattened, increasing rather rapidly, the last slightly ascending, equalling $\frac{1}{3}$ of the spire. Spire subconoid, suture shallow. Aperture scarcely oblique, obovate; margins connivent, united by a thin callus on the parietal wall; peristome slightly thickened, expanded, and reflexed, with acute edges; upper, outer, and basal margins regularly curved; columellar margin vertical, triangularly dilated; umbilicus narrow, rimate, subangulated around the base of the shell.

Length 31, diameter 12 mm.; aperture diam. 11·5, height 8 mm.

Hab. India: Samana Tsuk (6740 feet), near Upper Kuram Valley, N.W. Frontier Prov. (*Dr. T. G. Longstaff.*) Type in the British Museum.

This new species is allied to *E. griffithi*, Reeve, from Afghanistan. I was, in fact, at first inclined to regard it merely as a variety of that species. Although possessing one whorl more, it is considerably shorter than *griffithi*, which measures 40 mm. in length, it is less slender in the spire, the last whorl is relatively smaller, and the aperture is much less expanded, especially towards the

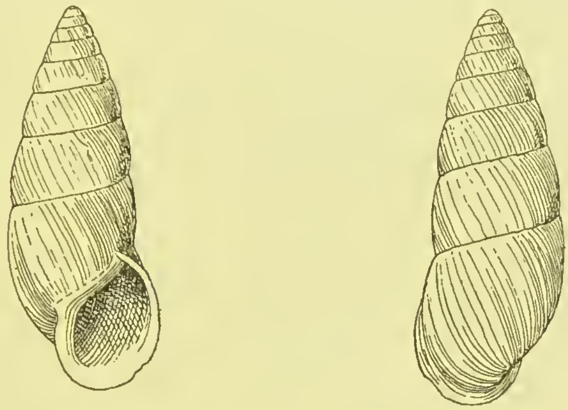

Fig. 91.—*Ena longstaffi.* $\frac{3}{2}$.

base. *E. longstaffi* also bears traces of affinity to *eremita*, Reeve, and *E. domina*, Benson, but may readily be distinguished from either by its less conoid, more attenuated spire. From *E. candelaris*, Pfeiffer, another allied form, it differs in the greater relative length of the last whorl, the conoid spire, the widened aperture, and the more developed peristome.

Dr. Longstaff, who collected the shell in 1906, presented five specimens, which range in size from 31 × 12 mm. (type) to 26 × 11·75 mm.

The illustrations represent the type in the British Museum.

219. Ena eremita, *Reeve.*

Bulimus eremita (Benson), Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 78, fig. 573; Pfeiffer, Conch.-Cab. *Bulimus*, 1853, p. 71, pl. 20, figs. 21, 22; ibid., Mon. Helic. Viv. iii, 1853, p. 356; Hanley & Theobald, Conch. Ind. 1870, pl. 23, fig. 6; Ancey, Bull. Soc. Malac. France, iii, 1886, p. 35.

Bulimus (Ena) eremita, Pfeiffer, Malak. Blätt. ii, 1856, p. 153.

Buliminus eremita, von Martens, Malak. Blätt. xv, 1868, p. 161; ibid., Imp. Obsh. Lyubi. Estest. Antrop. Etnoghr. xi, part 1, 1874, p. 18, pl. 2, fig. 13; Ancey, Bull. Soc. Zool. France, xviii, 1893, p. 43; Westerlund, Syn. Moll. Extramar. Reg. Palæarct. i, 1897, p. 7.
Buliminus (Petraeus) eremita, Nevill, Hand List, i, 1878, p. 134.
Bulimina (Petraeus) eremita, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 287.
Buliminus (Subzebrinus) eremita, Westerlund, Fauna Paläarct. Binnenconchyl. iii, 1887, p. 66; ibid., Katal. Paläarct. Binnenconch. 1890, p. 90; Kobelt in Rossmässler, Iconogr. iv, 1876, p. 62, pl. 135, fig. 1330, New Series, iii, 1888, pp. 38, 39, pl. 100, figs. 574, 575, 578, x, 1903, p. 55, pl. 291, fig. 1872; ibid., Conch.-Cab., Fam. Buliminidae, 1902, p. 951, pl. 133, fig. 7.
Pupa spelæa, Hutton, J. A. S. B. xviii, 1849, p. 653.

Original description:—"Shell cylindrically oblong, rather deeply umbilicated, whorls eight in number, convex, obscurely rather irregularly striated, aperture obliquely produced, columella broad, lip a little expanded; bluish white." (*Reeve.*)

Long. 18–22, diam. 7·5–9 mm.

Hab. India: Salt Range, Punjab (*Theobald*); Subathor, near Simla (*Hutton*); Lundi Kotal (*Spratt*). Tibet (*Mus. Cuming*). Afghanistan: Bolan Pass (*Hutton*).

Two specimens in the British Museum labelled "*Pupa spelæa*, Bolan Pass," received from Capt. Hutton, have convinced me that this form is cospecific with *Bulimus eremita*. They are indeed a trifle darker in colour and have the outer margin of the peristome not quite so much curved, but these slight differences are insufficient for separating the two forms. Both names having been published in 1849, I was at first uncertain which had priority. The sheet accompanying plate 78 of the Conchologia Iconica is dated September 1849, and although I have been unable to trace the actual date on which the part of the Journal of the Asiatic Society, containing Hutton's description, was issued, Mr. C. D. Sherborn informs me that it was certainly after September. Under these circumstances Reeve's name must be adopted for the species.

Ena eremita varies considerably, and some forms approach *E. sindica* on the one hand, and *E. salsicola* on the other. It has, however, a larger diameter in proportion to its length than the former, and is less convex in the spire than the latter.

220. Ena salsicola, *Benson.*

Bulimus salsicola, Benson, A. M. N. H. ser. 2, xix, 1857, p. 327; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 423; Hanley & Theobald, Conch. Ind. 1870, pl. 20, fig. 8.
Buliminus (Petraeus) salsicola, Nevill, Hand List, i, 1878, p. 134.
Bulimina (Petraeus) salsicola, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 287.

Buliminus (Napaeus) salsicola, Kobelt, Conch.-Cab., Fam. Buliminidae, 1899, p. 564, pl. 88, figs. 17, 18.
Buliminus (Subzebrinus) salsicola, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 49.

Original description :—"Testa rimata, ovato-cylindrica, tenui, sursum conica, læviuscula, oblique obsolete striatula, albida, maculis quibusdam translucentibus obscuris notata; sutura impressiuscula; apice subpapillari, obtusiusculo; anfractibus $6\frac{1}{2}$ planiusculis, ultimo $\frac{1}{3}$ testæ superante, subtus prope rimam compressiusculo; apertura vix obliqua, truncato-ovata; peristomate plane reflexo, marginibus conniventibus, dextro arcuato, callo parietali brevissimo, crassiusculo, tuberculum obsoletum angularem exhibente, junctis.

"Long. 18, diam. 8 mill., long. apert. 8, diam. 6 mill." (*Benson.*)

Hab. India: Pentepotomia (*Theobald*); Salt Range (*Theobald*).

"It is possible that this shell may exhibit coloured markings, like those of some other Punjab species, *B. pretiosus, sindicus*, etc., when in fine condition. It has a strong resemblance in form to the larger *B. bertheloti*, Pfr., and is also allied to the Levantine *B. ehrenbergi*." (*Benson.*)

The type of *E. salsicola* appears to have shared the fate of several other Bensonian types, for Dr. Doncaster informs me that it cannot be found. When Benson compared this species with *B. bertheloti* he must have overlooked *eremita*, to which it bears a far greater resemblance; it has, however, a more convex spire than the latter. It also approaches *domina*, but is not so strongly sculptured, while it is more distinctly subangulated around the umbilicus, which is also more open. Several specimens in the Theobald collection, from the Salt Range, Punjab, measure 22 × 10 mm. and 21 × 9·75 mm.

The shell figured by Dr. Kobelt in Conch.-Cab. is different from that in Conch. Ind., and possesses one whorl more.

221. Ena cœlebs, *Pfeiffer*.

Bulimus cœlebs (Benson), Pfeiffer, Symb. Hist. Helic. iii, 1846, p. 83; ibid., Mon. Helic. Viv. ii, 1848, p. 119; Reeve, Conch. Icon. v. 1848, *Bulimus*, pl. 47, fig. 301; ibid., 1849, pl. 69, fig. 498, juv.; Pfeiffer, Conch.-Cab., *Bulimus*, 1856, p. 260, pl. 70, figs. 12, 13; Hanley & Theobald, Conch. Ind. 1874, pl. 80, fig. 1.
Bulimus (Merdigerus) coelebs, Albers, Die Heliceen, 1850, p. 180.
Bulimulus (Ena) cœlebs, Adams, Gen. Rec. Moll. ii, 1855, p. 160.
Bulimus (Ena) coelebs, Pfeiffer, Malak. Blätt, ii. 1856, p. 153.
Buliminus (Napaeus) coelebs, von Martens, Die Heliceen, ed. 2, 1860, p. 234.
Buliminus (Petraeus) coelebs, Nevill, Hand List, i, 1878, p. 134.
Napæus cœlebs, Theobald, J. A. S. B. xlvii, 1878, p. 145.
Bulimina (Ena) coelebs, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 290.

Buliminus (Ena) coelebs, Kobelt, Conch.-Cab., Fam. Buliminidae, 1901, p. 687, pl. 103, fig. 21 (corrected to *Subzebrinus* on page 1007) (1902).
Buliminus (Subzebrinus) coelebs, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 47.

Original description:—" T. profunde rimata, oblongo-acuminata, tenuis, striatula, lineis confertis, spiralibus sub lente decussatula, pallide cornea, diaphana, strigis obliquis, albidis, opacis variegata; anfr. 7–8 vix convexiusculi, ultimus $\frac{1}{3}$ longitudinis subæquans, basi turgido-subcompressus; apertura ovalis; perist. tenue, expansum, intus sublabiatum, marginibus subconniventibus, columellari brevi, dilatato, patente.

" Long. 20, diam. $7\frac{1}{2}$ mill." (*Pfeiffer.*)

Hab. India: Mussoorie (*Hutton*); Almorah, N.W. Prov. (*Pfeiffer*); Naini Tal (*Stoliczka*); Kumaon, W. Himalayas (*Benson*); Kashmir (*Theobald*).

Ena cœlebs resembles *E. domina* in outline, but it is smaller, thinner in texture, and its sculpture is less coarse. It is provided with dense wavy spirals like *E. pretiosa*, but has a more contracted aperture than that species, and the peristome is more expanded, while the spire is more convex. The British Museum possesses fifteen specimens collected by Hutton at Mussoorie, measuring: long. 18–19, diam. 7 mm., and twelve shells from Almorah, received from the same naturalist, ranging in size from 17·5 × 8·25 to 15 × 8 mm.

222. Ena pretiosa, *Reeve*.

Bulimus pretiosus (Cantor), Reeve, Conch. Icon. v. 1849, *Bulimus*, pl. 83, fig. 619; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 351; ibid., Conch.-Cab., *Bulimus*, 1853, p. 70, pl. 20, figs. 27, 28; Hanley & Theobald, Conch. Ind. 1870, pl. 23, fig. 7.
Bulimulus (Ena) pretiosus, Adams, Gen. Rec. Moll. ii, 1855, p. 161.
Bulimus (Ena) pretiosus, Pfeiffer, Malak. Blätt. ii, 1856, p. 153.
Buliminus (Petraeus) pretiosus, Nevill, Hand List, i, 1878, p. 134.
Napæus pretiosus, Theobald, J. A. S. B. xlvii, 1878, p. 146.
Bulimina (Ena) pretiosa, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 291.
Buliminus (Subzebrinus) pretiosus, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 49.

Original description:—" Shell cylindrically ovate, compressly umbilicated, whorls smooth or finely striated, columella broadly vertically dilated, aperture rather small, nearly orbicular, lip thinly reflected; pale horny, transparent, waved with numerous opake-white streaks." (*Reeve.*)

Long. 21, diam. 10 mm. (*ex icon.*).

Hab. India: Chillianwalla, Banks of Jhilum, Kashmir (*Cantor*); Jhilum Valley (*Theobald*); Tinali (*Stoliczka*).

Theobald states that the species occurs sparingly throughout the Jhilum Valley below Uri, but is nowhere common except

about Kathai fort on the right bank, where it is abundant, although he saw only dead shells. He further observes that its range must be very limited, not having noticed it to the eastward, or anywhere in the cis-Ravi country.

E. pretiosa has a close affinity with such species as *E. eremita* and *E. cœlebs*, but is more conoid in the spire than the former and considerably smaller than the latter, being also differently marked. From *E. rufistrigata*, another ally, it may be separated by the broader base and the more convex spire. Three specimens in the Theobald collection are from the type locality. They agree with Reeve's figure, except in size, measuring 16 × 7·5 mm. They are rather thin in texture, and are densely covered with excessively minute, wavy spirals, a feature not mentioned in the original description. The upper margin of the peristome strongly arches forward. In the British Museum are also five specimens collected by Major Spratt at Lundi Kotal. These range in size between 21 × 8, 18·5 × 7, and 16 × 7 mm.

223. Ena mainwaringiana, *Nevill.*

Buliminus (Petræus) mainwaringianus, Nevill, Sci. Res. Second Yarkand Miss., Moll. 1878, p. 19, fig. 28.
Napæus mainwaringianus, Theobald, J. A. S. B. l, 1881, p. 47.
Buliminus (Subzebrinus) mainwaringianus, Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 937, pl. 132, figs. 1, 2.

Original description:—"Narrowly and superficially rimate, subcylindrically conical, of stout, smooth, and polished substance; striated, striæ less oblique than in the preceding [*stoliczkanus*], fewer and more regular, not crowded together in the same way, here and there one more developed than the others, with intermediate ones more or less obsolete; light horny-brown, variegated with opaque white markings, as in *B. pretiosus*; these markings are fewer, of a more zigzag, broader, and more irregular nature than those of the preceding; spire produced, apex scarcely obtuse; whorls 7, the three apical ones unusually short compared with the others, last whorl compressed; aperture very small, almost as broad as high, peristome pure white, outer margin considerably thickened; columella very broadly reflected, straighter than in the preceding, slightly subangulate, instead of rounded, at base.

"Long. 10, diam. $4\frac{1}{2}$ (last whorl to base of aperture, $5\frac{1}{4}$); apert. alt. $3\frac{7}{8}$, lat. 3 mm."

Hab. India: Murree (*Stoliczka*); Pakli Valley, Tandiani Hills, 4000–5000 ft. (*Theobald*); Lundi Kotal (*Spratt*).

"There is no Indian species with which I can compare this species. As to shape, the nearest I know of are some small dwarf forms of *Cylindrus insularis*; the species is, however, next allied to *B. pretiosus* and *B. rufistrigatus*." (*Nevill.*)

Theobald collected what he took to be a variety of this shell on the hills north-west of the Pakli Valley from 4000 to 5000 feet,

where he says it is not rare locally. He continues, "It has one whorl less than the type (which is described as having 7), but is slightly larger, a difference probably due to the lesser elevation at which my specimens lived. Shell with six whorls, outer edge of aperture not quite so convex, or full, as in Nevill's plate. In most other respects corresponding with the description of the type. The surface under a lens displays a microscopically decussated sculpture, not mentioned in the type. Two varieties occur: var. *major*, long. 15, lat. 6·2 mill.; var. *intermedia*, long. 12, lat. 4·4. This last I do not term 'minor' as it is actually larger that the type from Mari."

Fig. 92.—*Ena mainwaringiana*, large form. $\frac{3}{2}$.

The species is characterized by the large body-whorl and the strong decussated sculpture. It varies in size like most of the members of the group. Dr. Kobelt records specimens from Tandiani, in the Möllendorff collection, 14·5 × 7·5 mm., while the Theobald collection contains shells from the same locality, measuring from 13·75 × 5 to 11 × 4·5 mm. The same collection comprises a series from the Jhilum Valley, above Kohala, considerably larger than typical *mainwaringiana*. Two of these are here figured; they have the following dimensions:—16·5 × 8·5 and 15 × 7 mm.; while two others appear sufficiently distinct to base two new varieties upon them.

Var. **tumida**, nov.

Twice the length of the type and nearly three times its diameter.

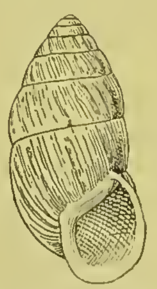

Fig. 93.—*Ena mainwaringiana*, var. *tumida*. $\frac{3}{2}$.

Long. 21·5, diam. 11 mm.

Var. dominula, nov.

Twice the length of the type and more than twice its diameter.

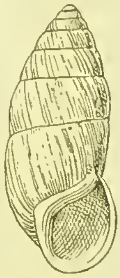

Fig. 94.—*Ena mainwaringiana*, var. *dominula*. $\frac{3}{2}$.

Long. 21·5, diam. 9·5 mm.

224. Ena rufistrigata, *Reeve*.

Bulimus rufistrigatus (Benson), Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 78, fig. 570; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 350; ibid., Conch.-Cab., *Bulimus*, 1853, p. 69, pl. 20, figs. 29, 30, pl. 21, figs. 16, 17; Hanley & Theobald, Conch. Ind. 1870, pl. 23, fig. 10.

Bulimulus (*Ena*) *rufistrigatus*, Adams, Gen. Rec. Moll. ii, 1855, p. 161.

Bulimus (*Ena*) *rufistrigatus*, Pfeiffer, Malak. Blätt. ii. 1856, p. 153.

Buliminus rufistrigatus, von Martens, Malak. Blätt. xv. 1868, p. 158.

Buliminus (*Petraeus*) *rufistrigatus*, Nevill, Hand List, i, 1878, p. 134.

Napæus rufistrigatus, Theobald, J. A. S. B. xlvii, 1878, p. 146; Westerlund, Katal. Paläarct. Binnenconch. 1890, p. 91; ibid., Syn. Moll. Extramar. Reg. Palæarct. i, 1897, p. 11.

Buliminus rufistrigatus, Kobelt in Rossmässler, Iconogr. vii, 1880, p. 44, pl. 198, figs. 1991–1993.

Bulimina (*Ena*) *rufistrigata*, Pfeiffer & Classin, Nomencl. Helic. Viv. 1881, p. 290.

Buliminus (*Chondrulopsis*) *rufistrigatus*, Westerlund, Fauna Paläarct. Binnenconchyl. iii, 1887, p. 70.

Buliminus (*Subzebrinus*) *rufistrigatus*, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 49.

Original description:—"Shell cylindrically oblong, compressly umbilicated, whorls eight in number, flatly convex, smooth, minutely crennlated at the sutures, aperture rather small, nearly orbicular; fulvous horny, irregularly finely streaked with opake-white." (*Reeve.*)

Long. 17, diam. 7 mm. (*ex icon.*).

Hab. India: base of the lower range of the Himalayas, between

the rivers Jumna and Sutlej (*Hutton*); Jhilum Valley (*Stoliczka*). Common on the outer hills from the Jumna to the Indus [Kashmir] (*Theobald*); Lundi Kotal (*Spratt*).

"Communicated to Mr. Benson by Capt. Hutton with the title *Pupa strigata*, of which the specific name is occupied in the present genus." (*Reeve.*)

Hanley considers *rufistrigatus* a somewhat doubtful species (Conch. Ind. p. 12), running into *pretiosus* and *eremita*, while Theobald (J. A. S. B. xlvii, 1878, p. 146) states that "closely allied to this species and with difficulty separable in a large series, are *eremita*, *sindicus*, *salsicola*, and *spelæus*."

Var. **gracilis** (*Benson*), *Hanley & Theobald*, Conch. Ind. 1870, p. 10, pl. 20, fig. 4; Nevill, Hand List, i, 1878, p. 134.

Smaller and slenderer than the type. Length 11 mm.
Hab. India: Kashmir (*Stoliczka*); Kakerhati (*Theobald*).

With the foregoing observations I entirely associate myself, but would exclude *spelæus*, as being absolutely synonymous with *eremita*, while I would add *domina*. With the large series of these species before me I have experienced great difficulty in defining their limits. On the whole, I would consider *rufistrigata* as being the smallest of the group and distinguishable from *eremita* by the more convex spire. Like most of the other members of the group, it occurs in sinistral as well as dextral specimens, the former being represented by a shell in the British Museum, collected at Simla by Hutton, and measuring 17×7 mm., together with three dextral ones. The species has also been found at Lundi Kotal by Major Spratt. The variety *gracilis*, again, connects the species with *E. beddomiana*, but differs principally from that species in having the last whorl proportionately larger. Five specimens of this variety from Kakerhati are in the Theobald collection.

Subgenus SERINA, *Gredler*.

Serina, Gredler, Gymnasialprogr. Bozen, 1898, p. 10 (as Genus); Möllendorff, Ann. Mus. Zool. St. Petersburg, vi, 1902, p. 356 (as Subgenus of *Buliminus*); Wiegmann, tom. cit. p. 270 (anatomy); Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 58.

TYPE: (first species) *Serina cathaica*, Gredler.

Range: China, India.

Shell more or less cylindrical-turreted, many-whorled; whorls convex, aperture oblong-rotundate, peristome widely expanded, scarcely reflexed, margins united by a distinct callus.

Jaw scarcely or not at all dilated towards the sides.

Radula transverse, with 41–48 teeth, of which the central and the first 4 or 5 laterals are in some species unicuspid, sometimes showing rudiments of outer side cusps.

Genital system approaching the general type of *Pupinidius*, *Petræomastus*, and *Subzebrinus*, being especially characterised by the unusual length of the spermatheca duct which, after separating from the ovisperm duct, with its diverticulum reaches far beyond the albumen gland, greatly exceeding the latter together with the ovisperm duct in length, in some species even 4½ or 5 times. The appendix of the penis, on the other hand, is much shorter, not reaching as far as the albumen gland, and attaining only ⅓ or at most ½ the length of the penis. (*Wiegmann.*)

225. **Ena tandianiensis**, *Kobelt* (emend.).

Buliminus (Subzebrinus) tandjanensis, Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 939, pl. 132, figs. 5, 6.

Original description:—"Testa angusta rimata, ovato-conica, tenuiuscula, striatula, albida, strigis fuscis crebris ornata, summo luteo-fusco. Spira regulariter conica lateribus vix convexiusculis, apice submamillato; sutura linearis, anfractus 7 vix convexiusculi leniter accrescentes, ultimus major, postice altitudinis ⅖ superans, basi rotundatus, initio obscure subangulatus, antice haud ascendens. Apertura vix obliqua, truncato-ovalis, intus strigis translucentibus; peristoma acutum, tenuiter albolabiatum, expansum, marginibus vix convergentibus, haud junctis, columellari brevi, subarcuato.

"Alt. 10·5, diam. max. 5·5, alt. apert. obl. 4·5 mm." (*Kobelt.*)

Hab. India: Tandiani Hills, Punjab.

This species has affinity with *E. kuluensis*, but possesses a shorter, more conoid spire, composed of seven whorls, whereas in *kuluensis* eight whorls may be counted. The aperture of *tandianiensis* is also more dilated. It is quite possible that with larger series the two forms will be found to intergrade insensibly.

226. **Ena kuluensis**, *Kobelt.*

Buliminus (Subzebrinus) kuluensis, Kobelt, Conch.-Cab., Fam. Buliminidæ, 1902, p. 938, pl. 132, figs. 3, 4.

Original description:—"Testa breviter rimata, ovato-turrita, subfusiformis, obsoleta striatula, tenuiuscula, parum nitens, albida, strigis fuscis subregulariter picta, summo fusco. Spira primum cylindrica, dein conica, apice obtusulo; sutura linearis, parum impressa. Anfractus 8 lente ac regulariter crescentes, ultimus postice ⅖ altitudinis occupans, subcylindricus, basi rotundatus, antice vix ascendens. Apertura fere verticalis, ovata, parum lunata; peristoma tenue, expansum, marginibus vix conniventibus, externo et basali albolabiatis, columellari vix dilatato.

"Alt. 13, diam. max. 5, alt. apert. obl. 4 mm." (*Kobelt.*)

Hab. India: Kulu, W. Himalayas.

Received by Möllendorff from the late Miss Linter as *B. rufostrigatus* var. *gracilis.*

Five specimens in the Theobald collection, from Kakerhati, I refer to *E. kuluensis*. It is shorter and more conoid than *rufistrigata*.

227. Ena beddomeana, *Nevill.*

Buliminus (*Petræus*) *beddomeanus*, Nevill, Sci. Res. Second Yarkand Miss., Mollusca, 1878, p. 20, fig. 29.
Napæus beddomeanus, Theobald, J. A. S. B. l, 1881, p. 47.
Buliminus (*Subzebrinus*) *beddomeanus* (Nevill), Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 939, pl. 132, figs. 15, 16.

Original description:—"This is a very interesting species, resembling somewhat, in shape of the whorls and aperture, *B. smithei*, 'Conchologia Indica,' pl. xx, fig. 3, but it is still nearer *B. eremita*, Bens., *l. c.* fig. 8, from which its produced spire, narrower whorls, and aperture easily distinguish it. Narrowly rimate, subcylindrically turreted, of solid, scarcely polished substance; closely, obliquely striate, striæ more regular and crowded together than in the two preceding forms [*stoliczkanus* and *mainwaringianus*]; of a very pale horn-colour, only

Fig. 95.—*Ena beddomiana*, var. *turrita*. $\frac{3}{2}$.

here and there discernible, on account of the crowded striæ, which are of a chalk-white colour; spire much produced, apex obtuse; whorls 10, increasing very gradually and regularly, last whorl compressed; aperture very small, peristome white, outer margin broadly reflected, very slightly arcuate (much as in pl. xx, fig. 3, *l. c.*); columella dilated, obliquely rounded at base.

"Long. $13\frac{3}{4}$, diam. $4\frac{3}{4}$ (last whorl to base of aperture, 5); apert. alt. $3\frac{1}{2}$, lat. $2\frac{7}{8}$ mm." (*Nevill.*)

Hab. India: Murree, Punjab (*Nevill*); Tandiani, Hazara (*Theobald*); Campbellpur (*Yerbury*).

Three varieties are indicated by Theobald as occurring at Tandiani, the hill station of Hazara, the most northern portion of the Punjab and bordering on Kashmir, where he says the species is rather common. The varieties he mentions are: var. *typica*, 10 whorls, long. 12·4, lat. 2·6 mill.; var. *turrita*, 11 whorls, long. 12·4, lat. 3 mill.; var. *pusilla*, 9 whorls, long. 8·5, lat.

2·5 mill. The var. *turrita* is here illustrated from a specimen in the Theobald collection in the British Museum, fig. 95 *c*, showing the aperture enlarged. Theobald further states that it is the most aberrant species of the genus, and that the flat expanded peristome, it sometimes displays, suggests a relationship to some *Pupæ*, such as *P. cœnopicta*.

Kobelt, when describing and figuring the species, appears to have been ignorant of the fact that a description and figure of it had already been published by Nevill. Kobelt's specimen is somewhat smaller than Nevill's type, the dimensions of the former being given as: alt. 10, diam. 4, ap. alt. 3 mm.

The Theobald collection contains four specimens which may be considered typical, having ten whorls and measuring 12 mm. in length; these are from Kakerhati, on the Simla Road. Four other shells have nine whorls, and measure 9 mm. in length, and may be referred to Theobald's var. *pusilla*; they agree with Kobelt's figures based on specimens from Tandiani in the Möllendorff collection, while, finally, four more specimens of eleven whorls, from Tandiani, pertain to the var. *turrita*; one measures 13·25 × 3·5 mm., and another, which is here figured, has the following dimensions: length 11·25, diam. 3·5 mm. The British Museum further possesses a specimen of the latter variety, collected by Major Yerbury at Campbellpur, situate to the south-west of the Hazara Hills.

228. **Ena hazarica**, sp. n.

Shell turreted-fusiform, finely obliquely striated, pale corneous, rather solid. Whorls 11, slightly convex, increasing slowly and regularly, the last scarcely wider than the penultimate, slightly

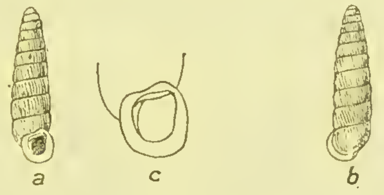

Fig. 96.—*Ena hazarica*. $\frac{3}{2}$.

ascending near the aperture. Spire straight, apex blunt, suture impressed. Aperture subquadrate-ovate, margins distant, united by a callus on the parietal wall, with a denticle near the upper margin; peristome thickened, strongly and flatly expanded, upper, outer, and basal margins evenly curved, columellar margin triangularly dilated, slightly curved, forming an obtuse angle with the basal margin. Umbilicus contracted, leaving only a narrow perforation.

Length 13, diam. 2·75 mm.

Hab. India: Tandiani, Hazara, N.W. Frontier (*Theobald*). Type in the British Museum.

The shell on which this new species is based occurred with several specimens of *E. beddomiana*, var. *turrita* in the Theobald collection. It differs from that form in the more slowly increasing whorls, the last being scarcely wider than the penultimate, and in the smaller aperture; it also differs in its dimensions, the length being a little greater and the diameter somewhat smaller, while the peristome is more expanded but not reflexed. The shell consequently has quite a different facies, and can be readily picked out from among its congeners.

Tandiani, the spot where the shell was taken in company with *E. beddomiana*, is the hill station situate in the Hazara hills, near the Afghan frontier, at an elevation of 8500 feet, where the prevailing rock appears to be limestone *.

Figs. 96, *a* & *b*, give the front and back view of the shell, while fig. 96 *c* shows the aperture.

229. Ena nevilliana, *Theobald.*

Peronæus nevillianus, Theobald, J. A. S. B. 1, 1881, p. 48.
Buliminus (Ena) nevillianus, Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 880, pl. 128, figs. 1, 2.
Buliminus (Subzebrinus) nevillianus, ibid. tom. cit. p. 1045.

Original description.—"Testa turrita, rimata, costanea [castanea], anfr. 8 ad 9 convexiusculis, transverse plicatis, lineisque spiralibus leviter decussatis, ultimo brevissime ascendente. Apertura oblonga, verticali. Margine pallido, simplici, expansiusculo, et juxta columellam breviter reflexo.

"Long. 15·7, lat. 4·1 mill., ad long. 11·9, lat. 4 mill." (*Theobald.*)

Hab. India: Tandiani, Hazara hills, Punjab, 8500 ft. (*Theobald*); Lundi Khotal (*Spratt*).

Fig. 97.—*Ena nevilliana.* Shell $\frac{3}{2}$, sculpture $\frac{5}{1}$.

The species had remained unfigured until Dr. Kobelt illustrated it from a specimen in the Möllendorff collection. The shell is strongly irregularly costulate-striate, the striæ being cut by coarse incised spirals; it is dark fuscous in colour, not flammulated.

* Theobald, J. A. S. B. 1, 1881, p. 47.

The Theobald collection contains two batches of the present species, both from Tandiani; one of four specimens was duly so labelled by Theobald and marked type. One of these is shown, together with the enlarged sculpture, in fig. 97 *a*. The second batch consists of five shells which were unnamed by Theobald; although the spirals cutting the transverse ribs are not quite so far apart as in the other shells, and the resulting bead-like sculpture is consequently not quite so coarse, I have no hesitation in referring this form likewise to *E. nevilliana*. One shell is depicted in fig. 97 *b*.

Genus **PUPOIDES**, *Pfeiffer*.

Pupoides, Pfeiffer, Malak. Blätt. i, 1854, p. 192 (as section of *Bulimus*, for *B. nitidulus*, Pfeiffer, and *B. marginatus*, Say); Pilsbry & Vanatta, Proc. Acad. Nat. Sci. Philadelphia, 1900, p. 585 (genus); Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 917; Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 70.

Leucochila, von Martens, Die Heliceen, ed. 2, 1860, p. 296 (as section of *Pupa*).

Leucochiloides, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 292 (as subsection of *Ena*).

Type, (first species) *Bulimus nitidulus*, Pfeiffer.

Range. Southern Asia, Equatorial Africa, Australasia, North America, Antilles, and South America.

Shell small, elongate-ovate, rather smooth, corneous; spire elongate, conoid; whorls $5\frac{1}{2}$–$7\frac{1}{2}$, convex, the last ascending in front; aperture provided with a parietal lamella; peristome widely and flatly expanded, reflexed, acute, margins approximating, united by a callus, edentulous.

Some Australian and African species are sinistral, one—*P. contrarius*, Smith—being amphidrome.

Anatomy unknown.

230. **Pupoides cœnopictus**, *Hutton*.

No. 7, *Pupa*, Hutton, J. A. S. B. iii, 1834, p. 85; No. 7, *Pupa* (mihi) *cœnopicta*?, ibid., tom. cit. p. 93.

Bulimus cœnopictus, Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 69, fig. 492; Benson, A. M. N. H. ser. 2, iv, 1849, p. 127; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 349; ibid., Conch.-Cab., *Bulimus*, 1854, p. 152, pl. 39, figs. 17–19; Blanford, J. A. S. B. xxxiv, 1865, p. 94; ibid., op. cit. xlv, 1875, p. 45; Hanley & Theobald, Conch. Ind. 1870, pl. 23, fig. 9.

Bulimulus (*Ena*) *cœnopictus*, Adams, Gen. Rec. Moll. ii, 1855, p. 160.

Bulimus (*Napaeus*) *coenopictus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 153.

Pupa coenopicta, Morelet, Ann. Mus. Civ. Genova, iii, 1872, p. 200.

Pupa (*Leucochila*) *cœnopictus*, Nevill, J. A. S. B. xlvi, 1877, p. 23; ibid., Hand List, i, 1878, p. 193 (*cœnopicta*); ibid., in Anderson, Zool. Res. Exp. W. Yunnan, i, 1879, p. 882 (*cœnopicta*); Peile, Journ. Bombay Nat. Hist. Soc. xi, 1908, p. 131.

Peronæus cœnopictus, Theobald, J. A. S. B. xlvii, 1878, p. 144.
Bulimina (*Ena* (*Leucochiloides*)) *cœnopicta*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 292.
Buliminus (*Leucochiloides*) *cœnopicta*, Tryon, Struct. Syst. Conch. iii, 1884, p. 54, pl. 99, fig. 65.
Buliminus cœnopictus, Ancey, Bull. Soc. Zool. France, xviii, 1893, p. 42.
Pupoides coenopictus, Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 918, pl. 130, figs. 22, 23.
Buliminus (*Pupa*) *fallax*, Jickeli, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1873, p. 5.
Buliminus (*Napaeus*) *fallax* (Say), Jickeli, Nova Acta K. Leop.-Carol. Akad. Naturf. xxxvii, 1874, p. 97, pl. 2, fig. 1 (jaw), pl. 5, fig. 1 (shell).

Original description:—"Shell about $2\frac{1}{2}$ lines in length; whorls 8; spire rather obtuse; colour brown; aperture rounded, margins reflected and interrupted by the body-whorl.

"Animal with four tentacles, buttoned at the tips, the upper pair longest and bearing the eyes at the summit; colour blackish." (*Hutton*, 1834.)

"Shell cylindrico-pyramidal, with 6 whorls, minutely striate; body-whorl ventricose, the others gradually tapering to an obtuse apex; aperture ovato-lunate, lips sub-reflected and white within; a single tooth at the junction of the outer lip with the body-whorl; colour brown." (*Hutton*, 1849.)

Length 4–4·5, diam. nearly 2 mm.

Hab. India: Salt Range, Kashmir, N.W. Punjab (*Theobald*); Agra (*Hutton*); Delhi, Roorkee (*Wood-Mason*); Patna (*Mainwaring*); Kutch (*Stoliczka*); Trichinopoly, Erode (*Blanford, Fairbank*); Travancore (*Beddome*); Dinapore, Kurnal (*Bacon*); Bombay Is. (*Peile, West*); Ceylon (*Nevill, Beddome*). Afghanistan (*Hutton, Laidlaw*). Abyssinia (*Blanford*).

In colour the shell varies from pale and dark corneous to fulvous, in some cases even rufous; it is usually more or less shining, and there are from 6 to 7 whorls, some specimens have a more elongate spire than others and the body-whorl is somewhat ventricose. In a small percentage of shells the parietal denticle near the upper margin of the peristome is obsolete or even entirely wanting.

Jickeli has united under the collective name of *Buliminus* (*Napaeus*) *fallax*, Say, practically all the forms of the genus known to him at the time of writing, stating that the different species have been based on characters which may occur in specimens from the same locality. Bourguignat, as might have been anticipated strongly protested against this method of uniting forms from the four quarters of the globe under a common designation and proceeded to add another new species *. While admitting that the various forms closely approximate each other, on geographical grounds alone I must consider it advisable to separate them, while,

* Ann. Sci. Nat., Zool. ser. 6, xv, art. 2, 1883, p. 62.

moreover, a careful scrutiny of large series of specimens has convinced me that *P. fallax* and *P. cœnopictus*, at least, may readily be separated by the characters of the peristome, which in *fallax* is much more strongly developed, thickened, and expanded, and has the upper margin more deflexed towards the body-whorl, forming an obtuse angle with the outer margin which is but slightly curved, whereas in *cœnopicta* the upper and outer margins together form a regular curve.

231. **Pupoides lardeus**, *Pfeiffer.*

Bulimus lardeus, Pfeiffer, P. Z. S. 1852, p. 157; ibid., Mon. Helic. Viv. iii, 1853, p. 348; ibid., Conch.-Cab., *Bulimus*, 1854, p. 151, pl. 39, figs. 14–16.

Bulimulus (*Napæus*) *lardeus*, Adams, Gen. Rec. Moll. ii, 1855, p. 162.

Bulimus (*Napaeus*) *lardeus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 153.

Buliminus (*Napaeus*) *lardeus*, von Martens, Die Heliceen, ed. 2, 1860, p. 234.

Buliminus (*Leucochiloides*) *lardeus*, Kobelt, Ill. Conchyl. Buch, ii, 1878, p. 273, pl. 84, fig. 12.

Bulimina (*Ena* (*Leucochiloides*)) *lardea*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 292.

Pupoides lardeus, Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 918.

Original description:—" B. testa subperforata, oblongo-ovata, solidula, striata, lardeo-micante, rufo-cornea; spira convexo-turrita, apice obtusa; anfract. 6, convexiusculis, ultimo $\frac{1}{3}$ longitudinis vix superante, basi subcompresso; apertura subverticali, truncato-ovali; perist. intus labiato, subangulatim patente marginibus remotis, callo tenui juxta insertionem dextri obsolete pliciferi junctis.

" Long. $5\frac{1}{2}$, diam. $2\frac{1}{3}$ mill." (*Pfeiffer.*)

Hab. India.

The Cuming collection in the British Museum contains five specimens of *Pupoides lardeus*. This form, which is perhaps only a variety of *P. cœnopictus*, is larger, possessing one more whorl, and is more conoid in the spire.

232. **Pupoides tutulus**, *Reeve.*

Bulimus tutulus (Benson), Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 84, fig. 625.

Pupa tutula, Küster, Conch.-Cab., *Pupa*, 1852, p. 133, pl. 17, figs. 8–10; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 535; Hanley & Theobald, Conch. Ind. 1876, pl. 156, fig. 6.

Pupa (*Pupilla*) *tutula*, Adams, Gen. Rec. Moll. ii, 1855, p. 170; Pfeiffer, Malak. Blätt. ii, 1856, p. 176.

Pupa (*Leucochila*) *tutula*, Nevill, Hand List, i, 1878, p. 194 (=*P. cœnopicta*, var.); Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 351.

Pupoides tutulus, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 71.

Original description:—"Shell conical, rather broad at the base, compressly umbilicated, whorls six in number, rounded, very minutely striated, columella broadly vertically dilated, with a small callosity above, aperture nearly round, lip slightly reflected; light chestnut, somewhat horny, callosity white." (*Reeve.*)

Long. $5\frac{1}{2}$, diam. 3 mill. Ap. 2 mill. longa, $1\frac{2}{3}$ lata. (*Pfeiffer.*)

Hab. India: Humeerpore, Bundelkhund (*Benson*); Delhi and Nagpore (*Wood-Mason*); Kutch and Sind (*Stoliczka*, *Blanford*); Patna (*Mainwaring*).

Reeve, in illustrating the species, makes no mention of the fact that his figure is enlarged, which is especially misleading owing to his invariable habit of omitting all measurement in the 'Conchologia Iconica.' There is, indeed, a note at the bottom of the page stating, "All exceedingly minute," but this is apt to be overlooked. As I have not seen any specimens I have been obliged to quote Pfeiffer's measurements taken from Benson's shells. *Pupoides tutulus* differs from its congeners at a first glance by its much broader base.

Genus CERASTUS, *von Martens.*

Cerastus (Albers), von Martens, Die Heliceen, ed. 2, 1860, p. 232 (as section of *Buliminus*); Jickeli, Nova Acta K. Leop.-Carol. Akad. Naturf. xxxvii, no. 1, 1874, p. 103, pl. 2, fig. 2 (jaw and radula, *Buliminus abyssinicus*); Schacko, in Möbius, Beitr. Meeresf. Mauritius u. Seychellen, 1880, p. 340 (radula of *abyssinicus*); Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 286; Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 40 (genus).

Type, (first species) *Bulimus distans*, Pfeiffer.

Range. India, Africa.

Shell rimate, ovate, costulate or striate, thin, corneous; whorls 6–7 convex, last whorl about equalling the spire; aperture rotundate-ovate, peristome reflexed, margins approaching, united by a thin callus.

Jaw 1·5 mm. across, slightly curved, yellowish corneous, strong, and exhibiting distinct, fairly regular lines of growth, which are crossed by stronger transverse striæ, which under a more powerful lens appear as irregular fine riblets. (*Jickeli.*)

Radula 4 mm. long, 1·5 mm. broad, tapering anteriorly, with 133 transverse rows, which ascend towards the margin, then descend and terminate horizontally. Longitudinal rows from 91 to 101. Central tooth varying from 0·030 to 0·036 mm. in length. Laterals characterized by prominent cutting edges on either side, and a basal plate elongated posteriorly and projecting somewhat wing-like towards the outer side. (*Jickeli.*)

Genitalia unknown.

233. **Cerastus abyssinicus**, *Pfeiffer.*

Buliminus habessinicus (Rüppell), Beck, Index Moll. 1838, p. 68 (nom. nud.).
Bulimus abyssinicus (Rüpp.), Pfeiffer, Zeit. Malak. ii, 1845, p. 157; ibid., Mon. Helic. Viv. ii, 1848, p. 110; Reeve, Conch. Icon. v, 1848, *Bulimus*, pl. 46, fig. 296; Pfeiffer, Conch.-Cab., *Bulimus*, 1854, p. 149, pl. 39, figs. 6, 7; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 55; Morelet, Voy. Welwitsch, Moll. 1868, p. 40; ibid., Ann. Mus. Civ. Genova, iii, 1872, p. 197; Hanley & Theobald, Conch. Ind. 1870, pl. 21, fig. 1; Bourguignat, Ann. Sci. Nat. Zool. ser. 6, xv, 1883, art. 2, p. 55, pl. 9, fig. 59; ibid., Moll. Afr. Equat. 1889, p. 50.
Bulimus (*Petraeus*) *abyssinicus*, Albers, Die Heliceen, 1850, p. 184; Pfeiffer, Malak. Blätt. ii, 1856, p. 154.
Bulimulus (*Petræus*) *abyssinicus*, Adams, Gen. Rec. Moll. ii, 1855, p. 162.
Buliminus abyssinicus, var. *ventrosa*, Martens, Malak. Blätt. xvi, 1869, p. 210.
Buliminus (*Petraeus*) *abyssinicus*, Jickeli, Nova Acta K. Leop.-Carol. Akad. Naturf. xxxvii, no. 1, 1874, p. 103, pl. 2, fig. 9 (jaw and radula), pl. 5, fig. 2 (shell).
Buliminus (*Cerastus*) *abyssinicus*, Kobelt, Illustr. Conchyl. Buch, ii, 1878, p. 273, pl. 84, fig. 6; Pollonera, Boll. Mus. Zool. Torino, xiii, 1898, no. 313, p. 6.
Bulimina (*Cerastus*) *abyssinica*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 286.
Buliminus (*Cerastus*) *abessynicus*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1899, p. 532, pl. 84, figs. 9–12.
Cerastus abessinicus, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 40.
Buliminus abyssinicus, var., Peile, Journ. Bombay Nat. Hist. Soc. xi, 1908, p. 131.

Original description:—"Testa rimato-perforata, ovato-acuminata, tenui, regulariter et confertim arcuato costata, diaphana, corneo-albida; spira elongata, conica; anfr. 7, convexis, ultimo $\frac{4}{9}$ longitudinis subæquaute; columella subrecta, intus subtorta; apertura oblongo-ovali; perist. acuto, margine dextro arcuato, breviter expanso, columellari dilatato, patente.

"Long. 21, diam. 11 mill." (*Pfeiffer.*)

Hab. India: Malwa (*Theobald*): Manda, Nerbudda Valley (*Blanford*); Poona (*Beddome*); Bombay Island (*Peile*). Abyssinia (*Blanford, Jickeli, Bourguignat*).

The occurrence of this species in such widely separated countries is somewhat startling, but may be accounted for by the introduction into India with plants. In a letter to Pfeiffer (recorded in Mon. Helic. Viv. vi, p. 55) Benson suggested that it had been imported with *Adansonia digitata*.

The shell appears to vary to a certain extent, and some of the specimens figured by Jickeli seem to be immature. This same author suggested that *Bulimus harrisi*, Reeve, is identical, but Reeve's figure does not bear out this contention.

C. abyssinicus is closely related to *C. distans* but the shell is

more diaphanous, the spire is shorter, the body-whorl is more inflated and the ribs are more distant. The interstices between the costæ are closely and minutely spirally striated. The figure in Conch. Ind. shows a more elongated spire, the last whorl is less swollen and the aperture narrower than in typical *abyssinica*.

In size the species varies from 20 × 12 and 19 × 11·5 to 16 × 10·5 mm.

234. Cerastus fairbanki, *Pfeiffer*.

Bulimus fairbanki, Pfeiffer, P. Z. S. 1857, p. 109; ibid., Mon. Helic. Viv. iv, 1859, p. 410; Hanley & Theobald, Conch. Ind. 1870, pl. 20, fig. 9.

Buliminus (Cerastus) scalaris (Hairburn), von Martens, Die Heliceen, ed. 2, 1860, p. 232.

Buliminus (Cerastus) fairbanki, Nevill, Hand List. i, 1878, p. 133; Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 677, pl. 102, fig. 23.

Bulimina (Cerastus) fairbanki, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 286.

Cerastus fairbanki, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 40.

Original description:—"T. anguste et compresse umbilicata, ovato-conica, tenuuiscula, conferte striata et costis irregulariter distantibus compressis subarcuatis sculpta, sub lente exilissime spiraliter striata, haud nitens, fulvescenti-albida; spira conica, apice obtusa; anfr. 6 convexi, ultimus spira vix brevior, juxta umbilicum compressus; apertura parum obliqua, elliptico-ovalis; perist. album, marginibus conniventibus dextro mediocriter expanso, columellari stricto, late patente.

"Long. 19, diam. 9½ mill." (*Pfeiffer*.)

Hab. India: Ahmednuggar (*Fairbank*).

This is the best characterized of all the Indian species of *Cerastus*, on account of the prominent and widely spaced ribs, which are about 2 mm. apart. Five specimens in the Beddome collection, from Ahmednuggar, the type-locality, show that two forms may be recognized. The one typical, broadly conoid, the other with more elongated spire and narrower base; the ribs are neither quite so widely nor so regularly spaced, and the form would almost constitute a passage to *C. distans*.

235. Cerastus malabaricus, *Pfeiffer*.

Bulimus malabaricus, Pfeiffer, Malak. Blätt. iv, 1857, p. 156; ibid., Mon. Helic. Viv. iv, 1859, p. 411.

Buliminus (Cerastus) deccanensis (Blanford), Nevill, Hand List, i, 1878, p. 133 (nom. mut.).

Bulimina (Cerastus) malabarica, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 286.

Cerastus malabaricus, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 41.

Original description:—"T. anguste umbilicata, conico-ovata, solidula, conferte striata, parum nitida, sordide albida; spira elongato-conica, apice obtusa; anfr. 6 convexi, ultimus $\frac{2}{5}$ longitudinis subæquans, juxta umbilicum leviter compressus; apertura obliqua, angulato-ovalis; perist. tenue, marginibus approximatis, callo tenuissimo, superne tuberculifero junctis, dextro perarcuato, breviter expanso, columellari dilatato, breviter patente.

"Long. 14, diam. $7\frac{1}{2}$ mill. Ap. $6\frac{1}{2}$ mill. longa, 4 lata." (*Pfeiffer.*)

Hab. India: Ahmednuggar, Deccan (*Fairbank*, *Blanford*).

The species never having been figured, I have taken the opportunity of illustrating the type in the Cuming collection. The shell bears some resemblance to that of *C. redfieldi*, Pfeiffer, being similar in shape, but it is smaller and has a narrower umbilicus. It is furnished with very fine spirals on the body-whorl, where the transverse striæ are less distinct than on the other portions of the shell.

Fig. 98.—*Cerastus malabaricus.* $\frac{3}{2}$.

I have seen five specimens in the Beddome collection, also from Ahmednuggar, which are a trifle larger than the type, measuring 15 × 9 mm., and are a little more fuscous, with the body-whorl not quite so tumid.

Blanford appears to have found it necessary to alter the specific name* on the plea that the habitat is not in Malabar, as Pfeiffer erroneously thought, but in the Deccan. In view of the admitted fact, however, that a specific name is intended to "designate, not to describe," I have found it expedient to disregard the latter name and to revert to Pfeiffer's original designation.

236. Cerastus jerdoni, *Reeve.*

Bulimus jerdoni (Benson), Reeve, Conch. Icon. v, 1848, *Bulimus*, pl. 46, fig. 297; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 335; ibid., Conch.-Cab., *Bulimus*, 1853, p. 73, pl. 20, figs. 11, 12.
Bulimus (*Petraeus*) *jerdoni*, Pfeiffer, Malak. Blätt. ii, 1856, p. 154.
Buliminus (*Cerastus*) *jerdoni*, Nevill, Hand List, i, 1878, p. 132; Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 893, pl. 127, figs. 17, 18.

* Nevill, Hand List, i, 1878, p. 133.

Bulimina (Cerastus) jerdoni, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 286.
Cerastus jerdoni, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 40.

Original description:—"Shell somewhat shortly ovate, largely umbilicated, spire rather short, acuminated, whorls six in number, swollen, rounded, columella broadly reflected, aperture nearly orbicular, lip expanded, scarcely reflected; dirty olive-brown." (*Reeve.*)

Long. 18, diam. 11·5 mill. (*ex icon.*).

Hab. India: Deccan (*Benson*); Poona (*Blanford*).

A shell from Ahmednuggar in the Benson collection, kindly sent for inspection by Dr. L. Doncaster, agrees with Reeve's figure, except in being paler in colour, which may be due to fading, and the outer margin of the peristome being narrower and damaged, probably as the result of rough handling. I am consequently disposed to regard this specimen as the type. The form figured by Hanley and Theobald is larger and with a less convex spire, and I refer this to the var. *redfieldi*, Pfeiffer.

The species differs from *C. densus*, Pfeiffer, in being of shorter and stouter build, of thinner texture, more finely, not plicately, striated, and in being covered with rather close, wavy spirals.

Var. redfieldi, *Pfeiffer.*

Bulimus redfieldi, Pfeiffer, Malak. Blätt. i, 1854, p. 66.
Bulimus jerdoni, var. *redfieldi*, Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 410.
Bulimus jerdoni, Hanley & Theobald, Conch. Ind. 1870, pl. 21, fig. 7.
Bulimina (Cerastus) jerdoni, var. *redfieldi*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 286.

Original description:—"T. profunde et compresse umbilicata, ovato-conica, tenuis, oblique confertim striata, pellucida, parum nitens, cereo-albida; spira conica, apice obtusa; anfr. 6 convexi, ultimus spiram aequans, infra suturam subturgidus, juxta umbilicum compressus; columella fere verticalis, medio introrsum subplicata; apertura obliqua, truncato-ovalis; perist. tenue, marginibus convergentibus, dextro perarcuato, expanso, subdilatato, columellari lato, patente.

"Long. 20, diam. 11 mill. Ap. 10 mill. longa, intus 5½ lata." (*Pfeiffer.*)

Hab. India: Ahmednuggar (*Redfield*); Poona (*Beddome*).

Described originally as a distinct species, evidently before he had seen *C. jerdoni*, Pfeiffer subsequently reduced it to varietal rank. The shell figured by Hanley and Theobald as *jerdoni* I refer to this variety. Three specimens from Ahmednuggar in the Cuming collection, accompanied by a label bearing the legend "*B. jerdoni*" in Pfeiffer's handwriting, also agree with the description and dimensions of *redfieldi*. The Beddome collection

further comprises five specimens from Poona. These range in dimensions from 21 × 12 to 19 × 11·5 mm., and have the transverse striæ more pronounced and more regular than is the case in typical *jerdoni*; the spiral incised lines, on the other hand, are not so wavy and not quite so apparent, while the peristome is more expanded, the columellar margin especially being very broadly triangular.

237. **Cerastus moussonianus**, *Petit.*

Bulimus moussonianus, Petit, Journ. Conchyl. ii, 1851, p. 266, pl. 7, fig. 4; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 346; Hanley & Theobald, Conch. Ind. 1870, pl. 21, fig. 4.

Buliminus (Cerastus) moussonianus, Nevill, Hand List, i, 1878, p. 132; Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 676, pl. 102, fig. 21; tom. cit. 1902, p. 892, pl. 127, figs. 12–16.

Bulimina (Cerastus) moussoniana, Pfeiffer & Clessin, Mon. Helic. Viv. 1881, p. 286.

Cerastus moussonianus, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 41.

Buliminus moussonianus, Peile, Journ. Bombay Nat. Hist. Soc. xi, 1908, p. 131.

Original description:—"B. testa ovato-ventricosa, tenui, translucida, umbilicata, pallide cornea; spira conica; anfractibus senis convexis, longitudinaliter minuteque striatis; striis obliquis; apertura subrotundata; labro tenui, expanso, subreflexo; umbilico parvo.

"Long. 16, larg. 9 mill." (*Petit.*)

Hab. India: Bombay (*Charbonnier*); Ahmednuggar (*Fairbank*); Baroach, Khandala, and Surat (*Blanford, Fairbank*); Sholapur (*West*); Bombay Island (*Peile*); Kutch (*Stoliczka*).

Petit states that it is near *B. abyssinicus*, but shorter and not

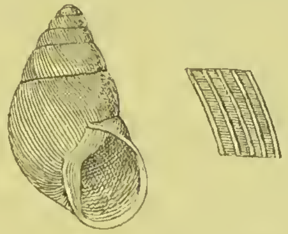

Fig. 99.—*Cerastus moussonianus*, var. Shell $\frac{3}{2}$, sculpture $\frac{6}{1}$.

as widely umbilicated, while Kobelt considers it probably a variety of that species. Pfeiffer and Clessin, on the other hand, are rather inclined to regard it as synonymous with *B. charbonnieri*, Pfr.

To judge from Petit's original figures I must consider it nearer to *C. abyssinicus*, but it has a more inflated body-whorl and the ribs appear more crowded. From *C. charbonnieri* it may be

separated by the shorter, more compressed spire, and from *C. distans* by the shorter spire, the broader base, and the coarser and more distant ribs, while, on the other hand, it agrees with *C. densus* in having the columellar margin of the peristome broadly and triangularly dilated, forming a distinct angle with the basal margin.

I here figure a shell (fig. 99) in the British Museum from Sholapur, Central India, received from Arthur A. West, which has a more elongated spire than typical *moussonianus*, measuring 18 × 11·5 mm. and somewhat approaches *C. distans* in shape, while fig. 100 represents another specimen in the British Museum, labelled "India" only; the latter approximates closely to Petit's original figure, except in being a trifle smaller, measuring 15·5 × 10·5 mm.

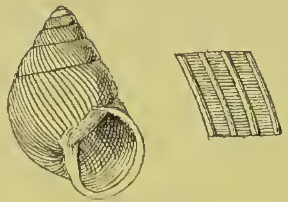

Fig. 100.—*Cerastus moussonianus.* Shell $\frac{3}{2}$, sculpture $\frac{5}{1}$.

Three specimens in the Cuming collection, collected by Fairbank at Ahmednuggar, are labelled *moussonianus*, Pfeiffer; they are larger than the type, being 18 mm. long.

238. Cerastus segregatus, *Reeve.*

Bulimus segregatus (Benson), Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 79, fig. 587; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 440; ibid., Conch.-Cab., *Bulimus*, 1853, p. 77, pl. 21, figs. 8, 9; Hanley & Theobald, Conch. Ind. 1874, pl. 80, fig. 10.
Bulimus (Napaeus) segregatus, Pfeiffer, Malak. Blätt. ii, 1856, p. 153.
Buliminus segregatus, var. *minor*, von Martens, Imp. Obsh. Lyubi. Estest. Antrop. Etnoghr. xi, part i, 1874, p. 21, pl. 2, fig. 16.
Napæus segregatus, Theobald, J. A. S. B. xlvii, 1878, p. 145.
Bulimina (Pachnodus) segregata, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 284.
Buliminus segregatus, Ancey, Bull. Soc. Malac. France, iii, 1886, p. 46; Westerlund, Fauna Paläarct. Binnenconchyl. iii, 1887, p. 72; ibid., Katal. Paläarct. Binnenconch. 1890, p. 92; ibid., Syn. Moll. Extramar. Reg. Palæarct. i, 1897, p. 11.
Buliminus (Chondrulopsis) segregatus, Westerlund, Fauna Paläarct. iii, 1887, p. 72.
Buliminus (Ena?) segregatus, Kobelt, Conch.-Cab., Fam. Buliminidae, 1901, p. 687, pl. 103, fig. 20, corrected to (*Subzebrinus*) on page 1007 (1902).

Original description:—"Shell ovately conical, somewhat pyramidal, rather swollen at the base, umbilicated, whorls seven in

number, convex, obliquely striated, columella broad, vertical, aperture small, rounded, lip thin; dull horny." (*Reeve.*)

Long. 11, diam. 6 mm. (*ex icon.*).

Hab. India: Simla (*Benson*); Chinab Valley, Kashmir (var. *pusillus*, Theobald). Turkestan: Hills near Schachimardan (var. *minor*, Fedtschenko).

Theobald records the finding in Kashmir of a single specimen of what seemed to him a variety of *segregatus*, but it had an abnormal look about it. It measured 11·2 × 5 mm. and had the ordinary horny appearance of *cœlebs* and its allies. A smaller form, which he names var. *pusillus*, he also considered to pertain to this species and was far from rare in the Chinab Valley above 6000 feet. It only measured 9 × 3·8 mm. Pfeiffer records the following measurements from shells in the Benson collection:—Long. 13, diam. 7 mm. Ap. 5 mm. longa, 3·5 lata.

I have not seen specimens, and the type appears to be lost.

239. **Cerastus densus**, *Pfeiffer.*

Bulimus (*Petraeus*) *densus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 154.
Bulimus densus, Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 424; ibid., Novit. Conch. ser. 1, iii, 1868, p. 377, pl. 87, figs. 25, 26; Hanley & Theobald, Conch. Ind. 1874, pl. 79, fig. 6.
Buliminus (*Cerastus*) *densus*, Nevill, Hand List, i, 1878, p. 286; Kobelt, Conch.-Cab., Fam. Buliminidae, 1901, p. 686, pl. 103, fig. 18.
Bulimina (*Cerastus*) *densa*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 286.
Cerastus densus, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 40.

Original description:—"T. profunde rimata, subperforata, ovato-conica, solidula, dense costulato-striata, vix nitidula, pallide carnea; spira conica, obtusinscula; sutura obsolete marginata; anfr. 6, convexiusculi, ultimus spira vix brevior, basi compressus; columella leviter arcuata; apertura parum obliqua, elliptico-ovalis; perist. albo-labiatum, marginibus conniventibus, dextro arcuato, expanso, columellari late patente.

"Long. 20, diam. 10 mill. Ap. c. perist. 10 mill. longa, 7½ lata." (*Pfeiffer.*)

Hab. India: Malabar (*Fairbank*); Ahmednuggar (*Blanford*); Poona (*Stoliczka*).

Pfeiffer indicates a var. β "elongatus, basi subangulatus; long. 24½, diam. 10 mill."

The Beddome collection contains five specimens, from Ahmednuggar, which were labelled *jerdoni*, but which, without hesitation, I refer to *densus*.

C. densus differs from *C. jerdoni* in having a more attenuated spire, the whorls increase less rapidly, and the lip, while more thickened, is less reflexed. The sculpture is also different, the transverse striæ being a trifle coarser and more regularly spaced,

especially on the last whorl, and the spirals are much less in evidence, being not only much more minute, but more or less obsolete.

A specimen in the British Museum, acquired by purchase, from Bombay and labelled *B. fairbanki*, I also refer to the present species.

240. **Cerastus distans**, *Pfeiffer.*

Bulimus distans, Pfeiffer, P. Z. S. 1856, p. 331; ibid., Mon. Helic. Viv. iv, 1859, p. 409.

Buliminus (Cerastus) distans, von Martens, Die Heliceen, ed. 2, 1860, p. 232; Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 966.

Bulimina (Cerastus) distans, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 286.

Cerastus distans, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 40.

Original description:—"T. compresse-umbilicata, ovato-conica, tenuiuscula, costis subarcuatis, chordæformibus, subdistantibus sculpta, subdiaphana, albida; spira elevato-conica, obtusula; anfr. 7 convexi, ultimus $\frac{3}{7}$ longitudinis subæquans, basi rotundatus; columella profunde subtorta; apertura parum obliqua, acuminato-subovalis; perist. tenue, marginibus convergentibus, dextro breviter expanso, columellari dilatato, patente.

"Long. $22\frac{1}{2}$, diam. $10\frac{1}{2}$ mill. Ap. 10 mill. longa, $5\frac{2}{3}$ lata." (*Pfeiffer.*)

Hab. India: Poona (*Beddome*). Karak I., Persian Gulf (*Mus. Cuming*).

The present species and *C. charbonnieri*, both as from Karak Island, in the Persian Gulf, were described by Pfeiffer in the same paper, being based upon specimens in the Cuming collection. After a careful examination of the types of both, now in the British Museum, I am unable to separate the two forms specifically, the only differences between them being that *charbonnieri* has one whorl less and is a smaller shell, its dimensions being: length 15, diam. 8 mm.; ap. 7 mm. long. 4·5 wide, while the ribs are finer and more crowded. It can, at the most, be only regarded as a variety. From *C. abyssinicus* it differs in being of a more solid texture, in having a more elongated spire, and in the ribs being more crowded.

Although Pfeiffer mentioned only the habitat Karak Island for *C. distans*, von Martens recorded the fact that Albers' collection contained specimens labelled Malabar. Providing the latter term be understood in its wider application, as in the case of *C. malabaricus*, there would be no inherent improbability in its occurrence farther north in India and I was, therefore, not surprised to find several specimens from Poona in the Beddome collection which, although erroneously labelled *jerdoni*, were absolutely undistinguishable

from the type of *distans*. They range in size from 19 × 10 to 18·5 × 9 mm. Pfeiffer in describing *Bulimus distans* alluded to the fact that it differed from *B. abyssinicus* in its more elongated spire and the sculpture.

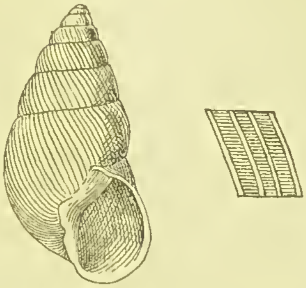

Fig. 101.—*Cerastus distans*. Shell $\frac{3}{2}$, sculpture $\frac{5}{1}$.

As neither *C. distans* nor *C. charbonnieri* has been illustrated before, I add figures of the two from the types in the Cuming collection, with an enlarged view of the sculpture of the former.

Var. **charbonnieri**, *Pfeiffer*.

Bulimus charbonnieri, Pfeiffer, P. Z. S. 1856, p 331; ibid., Mon. Helic. Viv. iv, 1859, p. 410.

Fig. 102.—*Cerastus charbonnieri*. $\frac{3}{2}$.

Genus RACHISELLUS, *Bourguignat*.

Rachisellus, Bourguignat, Moll. Afr. Equat. 1889, p. 68; Thiele, Wiss. Ergebn. Deuts. Zentr.-Afr. Exp. iii, Zool. 1911, p. 201.
Rhachisellus, Connolly, Ann. S. Afr. Mus. xi, 1912, p. 164.

Type, *Bulimus punctatus*, Anton.

Range. India, Tropical Africa.

Shell elongate-oblong, last whorl shorter than the spire, attenuated at the base; umbilical perforation open and deep, more or less covered by the much reflexed columellar margin, the base of the last whorl subangulated around the umbilicus. Upper, outer, and basal margins of peristome straight, acute, not thickened or reflected.

The straight, acute margins of the peristome, giving the shell an Achatinoid aspect, so different from typical *Ena*, are a character sufficient, in my opinion, to warrant the retention of the group as a separate genus, and I therefore follow Bourguignat's lead in this respect.

The radula closely approximates that of *Ena obscura*, according to Schacko *. A specimen of *R. punctatus* from Tette is reported on by him as follows :—Central tricuspid, very small ; laterals, strong, with a large, obliquely truncate central plate ; marginals very abundant, with 7 side cusps.

This genus, established in 1889 by Bourguignat, had been universally relegated to the synonymy of *Rachis*, Albers (*Rhachis*, Pfeiffer and von Martens), but recently Dr. Thiele † has stated that an examination of the radula of *punctatus* has satisfied him that this species does not pertain to the latter genus but to *Ena* in its wider sense. He consequently revives *Rachisellus* but reduces it to a subgenus of *Ena*. Although von Martens indicated *punctatus* as the type of the former, at the same time, following in Pfeiffer's footsteps, altering its orthography to *Rhachis*, Dr. Thiele points out that as this species was not included by Albers in 1850 when the section *Rachis* was established by him, with *Bulimus pallens*, Jonas, as first species, the latter must be regarded as type.

241. Rachisellus adumbratus, *Pfeiffer*.

Bulimus adumbratus, Pfeiffer, P. Z. S. 1854, p. 291; ibid., Mon. Helic. Viv. iv, 1859, p. 472; Hanley & Theobald, Conch. Ind. 1876, pl. 148, fig. 8.

Bulimus (*Rhachis*) *adumbratus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 161.

Buliminus (*Rhachis*) *adumbratus*, von Martens, Die Heliceen, ed. 2, 1860, p. 231 ; Nevill, Hand List, i, 1878, p. 130 ; Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 675, pl. 102, fig. 19.

Bulimus adumbratus, Nevill, Enum. Helic. Ceylon, 1871, p. 3.

Bulimina (*Rachis*) *adumbrata*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 285.

Rachis adumbratus, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 296.

Rhachis adumbratus, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 37.

Original description :—" T. subobtecte perforata, ovato-conica, solidula, lævigata, albido et roseo adumbrata, strigis distantibus roseo-fuscis et punctis sparsis pellucidis signata ; spira conica, apice acuta, nigra ; anfr. 6 vix convexiusculi, ultimus spira paullo brevior, basi rotundatus, fascia 1 castanea notatus ; columella subverticalis ; apertura obliqua, oblongo-ovalis ; perist. simplex,

* In Möbius, Beitr. Meeresfauna Ins. Mauritius u. Seychellen, 1880, p. 340.
† Wiss. Ergebn. Deuts. Zentr.-Afr. Exp. iii, Zool. 1911, p. 201.

rectum, margine columellari papyraceo, fornicatim reflexo, subadnato.

"Long. 20, diam. 9½ mill. Ap. 9½ mill. longa, 6 lata." (*Pfeiffer.*)

Hab. Ceylon (*Nevill*).

242. **Rachisellus trutta**, *Blanford.*

Bulimus trutta, Blanford, J. A. S. B. xxxv, 1866, p. 42; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 125; Hanley & Theobald, Conch. Ind. 1874, pl. 80, fig. 4.

Buliminus (Rhachis) trutta, Nevill, Hand List, i, 1878, p. 131; Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 668, pl. 102, fig. 20.

Bulimina (Rachis) trutta, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 285.

Rhachis trutta, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 39.

Original description:—"Shell perforated, conically ovate, thin, finely striated, light yellowish, with two spiral rows of sub-distant chestnut spots, sub-quadrate in form, on all the whorls, and two spiral chestnut stripes, the lower sometimes very faint, upon the last whorl below the periphery. Spire conical, apex acute, sutures impressed. Whorls 5½, convex. Aperture nearly oval, slightly oblique. Peristome thin, margins united by a thin callus, columellar margin vertical, narrowly reflexed, the reflexed portion meeting the penultimate whorl at an angle.

"Length 14, diam. 9 millim. Aperture 7 mill. long, 4½ broad." (*Blanford.*)

Hab. India: Anamullay Hills (*Beddome, Blanford*).

"There is some doubt whether the shells above described be adult. They have a somewhat immature appearance, but all the specimens sent, four in number, are of precisely the same size, and the thin peristome is characteristic of the group of *Bulimus Bengalensis*, to which the present species belongs. From that species and its allies, it is easily distinguished by its short conical form." (*Blanford.*)

Most of the specimens of this species I have seen are larger than the type. Three shells in the British Museum measure 19 × 10·5 mm., two in the Theobald collection 18 × 10 mm.; while five specimens in the Beddome collection range from 16 × 10 to 12·5 × 8 mm., the latter being immature. All possess the two narrow, chestnut, spiral infra-peripheral bands and the two supra-peripheral spiral rows of subquadrate spots, referred to in the original diagnosis.

The species appears to be confined to the Anamullay Hills, as I have neither seen specimens from any other locality nor traced any record of such.

243. Rachisellus bengalensis, *Lamarck.*

Bulimus bengalensis, Lamarck, Anim. sans Vert. vi, part 2, 1822, p. 124; Deshayes, ibid., ed. 2, viii, 1838, p. 233; Delessert, Recueil Coq. 1841, pl. 28, fig. 4; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 194; Reeve, Conch. Icon. v, 1848, *Bulimus*, pl. 45, fig. 289; Hanley & Theobald, Conch. Ind. 1874, pl. 80, fig. 7; ibid., 1875, pl. 148, fig. 6.

Bulimus (Mesembrinus) bengalensis, Pfeiffer, Malak. Blätt. ii, 1856, p. 158.

Bulimus (Rhachis) bengalensis, von Martens, Die Heliceen, ed. 2, 1860, p. 231.

Buliminus (Rhachis) bengalensis, Nevill, Hand List, i, 1878, p. 130; Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 668, pl. 102, figs. 8, 9.

Bulimina (Rachis) bengalensis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 285.

Buliminus (Rachis) bengalensis, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 296; Peile, Journ. Bombay Nat. Hist. Soc. xi, 1908, p. 131.

Rhachis bengalensis, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 37.

"H. testa ovato-acuta, perforata, tenui, diaphana, glabra, albo-lutescente, fusco-fasciata, ultimo anfractu subventricoso, bifasciato; suturis linea nigra marginatis; labro subreflexo." (*Deshayes.*)

Long. 10 lin.

Hab. India: Bengal (*Deshayes*); Bombay (*Peile*); Chittagong (*Raban*); Raneegunge (*Stoliczka*); Chandernagore, Calcutta, Barrackpore (*Nevill, Mainwaring*); Bengal and Anamullays (*Beddome*).

The foregoing brief description may be supplemented as follows:—

Shell perforated, ovate-acute, thin, diaphanous, smooth, yellowish-white, usually encircled by two, rarely three, bands, one bordering the suture. Spire conical, apex acute, black. Whorls 6, slightly flattened, the last convex, about equalling the remainder of the shell in height. Aperture spacious, oval; peristome simple, acute, columellar margin dilated.

Long. 22, diam. 10 mm.

The present species may be distinguished from its nearest ally—*R. prætermissus*—by its broader base and more conoid spire. It is, besides, usually paler in colour and is furnished with dense minute spirals, a feature I have not observed in the other species. It is thinner in texture than either *E. pulcher* or *E. adumbratus.* The third and fourth bands are most persistent, but many specimens have the second band represented by a thin line. Seven specimens from the Anamullays, in the Beddome collection, labelled *prætermissa*, I refer to *bengalensis*. The Theobald collection contains six specimens, labelled Bengal, three of which are immature and possess four bands; three others have three bands interrupted transversely, the third becoming entire towards the aperture.

244. **Rachisellus prætermissus**, *Blanford*.

Bulimus prætermissus, Blanford, J. A. S. B. xxx, 1861, p. 360; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 131; Hanley & Theobald, Conch. Ind. 1870, pl. 19, fig. 4.
Buliminus (*Rhachis*) *prætermissus*, Nevill, Hand List, i, 1878, p. 130.
Bulimina (*Rachis*) *praetermissa*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 285.
Buliminus (*Rhachis*) *praetermissus*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 670, pl. 102, fig. 12.
Rhachis praetermissus, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 38.

Original description:—"Testa perforata, oblongo-conica, tenuis, nitida, striata, luteo-albida, varie rufo vel fusco spiraliter fasciata et transverse strigata, plerumque uni- vel trifasciata, interdum unicolor albida. Spira conica, apice acutiuscula plerumque nigra. Anfr. 7 convexiusculi, ultimus $\frac{2}{5}$ longitudinis subæquans, basi rotundatus. Apertura vix obliqua, subovalis; peristoma simplex, rectum, margine columellari verticali, fornicatim reflexo.

"Long. 19, diam. 10 mm. Ap. 8 alta, $5\frac{1}{2}$ lata." (*Blanford*.)

Hab. India: Orissa (*Blanford*, *Stoliczka*, *Theobald*); Salem district (*King*); Bengal (*Oldham*); Bombay (*Leith*); Madura Hills (*Beddome*).

"This species is intermediate between *B. mavortius*, Reeve, and *B. punctatus*, Anton, on the one hand, and *B. Bengalensis*, Lam., on the other. It resembles the two first-named in form, but differs from both in the absence of the transparent spots on the whorls. It is less solid than *B. mavortius* and broader in proportion to its length than *B. punctatus*. From *B. Bengalensis* it is distinguished by its small mouth aud by less tumidity. It varies considerably in marking, of which we have the following varieties:—

"1. Yellowish white throughout; apex the same.

"2. Yellowish white with a single brown stripe round the lower portion of the last whorl; apex white.

"3. Upper whorls transversely obliquely striped with pale reddish lines; last whorl purplish, with a dark brown stripe round the lower portion. Apex black.

"4. Yellowish white, two pale reddish brown lines round the lower portion of the last whorl, the upper running along the suture above. The upper part of the whorls obliquely striped with interrupted streaks of the same colour. Apex black.

"5. Three rather broadish and irregular brown stripes around the last whorl; two on the upper ones, becoming purplish black near the apex; apex black.

"6. 3 stripes of dark brown on the lower whorl, 2 on the upper ones. Apex black. Similar to the marking in *B. Bengalensis*.

"We have no specimens with more than 3 stripes around the last whorl.

"7. Whorls obliquely and undulately striped with brown, one stripe round the lower part of the last whorl. Suture near the top purplish black; apex black.

"Specimens of *B. prætermissus* were first found by ourselves 5 years ago in the tributary mehals of Cuttack, in Orissa; and were by us long considered as a variety of *B. Bengalensis.* The first six varieties came thence; No. 7, which is rather more highly coloured, occurs amongst the shells sent from S. India by Mr. King, who found it on detached hills, N.E. of Conaniputty, in the Salem district." (*W. T. and H. F. Blanford.*)

Rachisellus prætermissus is allied to *R. bengalensis* but has a narrower base and a more slender spire. It appears rather more variable as regards banding than any of the other Indian species of *Rachisellus*. Among a number in the Beddome collection, from the Madura Hills, occur two shells which possess four bands, more or less interrupted by transverse streaks, especially the upper three, and a faint indication of a fifth band around the umbilicus. Four others have only the fourth (sub-peripheral), while a fifth has in addition a broad pale reddish zone between the suture and the periphery, apparently the result of the fusion of the first three bands, and a coloured columella. One specimen is bandless. All are subangulated at the periphery. Another batch in the same collection, labelled S. India, contains two unbanded shells, one of which is of a pale fuscous colour, becoming darker towards the aperture, especially below the periphery. A third specimen is ornamented with six bands, three of which—interrupted—are supra-peripheral, and three infra-peripheral, the fourth rather broad and entire, dark chestnut, the fifth narrower, paler, and interrupted, the sixth darker and broader, entire, and giving off a paler fuscous zone reaching as far as the umbilicus. The Theobald collection in the British Museum comprises two shells from Orissa, which measure 22 × 12·5 mm. and have the third and fourth bands faint and interrupted. Two specimens, collected at Bombay by A. H. Leith, are labelled *mavortius*, var.; these I refer to *prætermissus*.

245. **Rachisellus pulcher**, *Gray.*

Bulimus pulcher, Gray, Ann. Philos. new series, ix, 1825, p. 414; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 210.

Helix pulchra, Wood, Index Test., Suppl. 1828, pl. 7, fig. 19.

Bulimus mavortius, Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 77. fig. 561; Pfeiffer, Conch.-Cab., *Bulimus*, 1853, p. 74, pl. 20, figs. 13, 14; ibid., Mon. Helic. Viv. iii, 1853, p. 423; Nevill, Enum. Helic. Ceylon, 1871, p. 3; Hanley & Theobald, Conch. Ind. 1876, pl. 148, fig. 5.

Buliminus (Rhachis) mavortius, von Martens, Die Heliceen, ed. 2, 1860, p. 231.

Buliminus (Rhachis) pulcher, Nevill, Hand List, i, 1878, p. 130; Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 671, pl. 102, fig. 13.

Bulimina (*Rachis*) *pulchra*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 285.

Rhachis pulchra, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 38.

Original description :—" Testa ovato-conica, tenuis, albida; fasciis tribus purpureo-fuscis ornata; anfractibus convexiusculis. Peristomate simplici, labio interiori roseo." (*Gray.*)

Length 23, diam. 10 mill. Ap. 10 × 6 mill.

Hab. Ceylon (*Gardiner*, *Benson*, *Layard*); Balapiti (*Nevill*). India: Trichinopoly; Travancore and Tinnevelly (*Beddome*).

When first described by Gray its habitat was unknown, and it was believed by Pfeiffer to be an African species until Benson sent him authentic Cingalese specimens.

The type of *Bulimus mavortius*, Reeve, which is in the British Museum, measures 14·5 × 7·25 mm., and is more slender of spire than *pulcher*, Gray, so that it is perhaps advisable to distinguish this form as a variety. All the specimens possess three bands, one peripheral, one below and one above the periphery. The two forms are more solid than any of the other Indian species of *Rachisellus*. The Cuming collection contains three specimens, collected by Mr. Gardiner, which are more or less speckled and have only two bands, one at the periphery and the other below, agreeing in this respect with the shell figured in Conch. Ind. as *mavortius* (copied by Kobelt as *pulcher*); in addition they are ornamented with a diffused pink internal patch on the columella. Another shell in the British Museum also possesses two similar bands, while a second specimen is without bands but has the four apical whorls blackish purple. These measure 22 × 10 mm. Four shells in the Beddome collection are yellowish white, with a few scattered freckles and only one band, the third (infra-peripheral) of a bright pink. Four others, from Travancore, in the same collection, are provided with four bands (two supra-peripheral), the upper one not reaching to the aperture and the other three being more or less interrupted by transverse streaks towards the margin. These bands are all bright pink and the columella is similarly coloured. The apical whorls are purplish black, which colour becomes gradually diffused lower down. Lastly, of four specimens from Tinnevelly, also in the Beddome collection, two have the usual three bands and two are provided only with the peripheral and one infra-peripheral band of a chestnut colour.

246. Rachisellus punctatus, *Anton.*

Bulimus punctatus, Anton, Verz. Conch. 1839, p. 42; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 212; Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 65, fig. 452; Deshayes, in Férussac, Hist. Nat. Moll. ii, part 2, 1851, p. 86, pl. 157, figs. 7, 8; Pfeiffer, Conch.-Cab., *Bulimus*, 1854, p. 229, pl. 62, figs. 22–24; Morelet, Sér. Conchyl. livr. 2ème, 1860, p. 66; Hanley & Theobald, Conch. Ind. 1870, pl. 20, fig. 10.

Bulimus (Rhachis) punctatus, Pfeiffer, Malak. Blätt. ii, 1856, p. 161; Tryon, Struct. Syst. Conch. iii, 1884, p. 49, pl. 99, fig. 62.
Buliminus (Rhachis) punctatus, von Martens, Die Heliceen, ed. 2, 1860, p. 231; ibid., Malak. Blätt. vi. 1860, p. 212; ibid., in von der Decken, Reisen in Ost-Afrika, iii, Abth. 1, 1869, p. 59; Nevill, Hand List, i, 1878, p. 130; Kobelt, Illustr. Conchyl. Buch, ii. 1878, p. 273, pl. 84, fig. 14.
Buliminus punctatus, von Martens, Nachr. Deuts. Malak. Ges. 1869, p. 153.
Bulimus punctatus, Nevill, Enum. Helic. Ceylon, 1871, p. 3.
Rhachis punctatus, Schacko, in Möbius, Beitr. Meeresfauna Ins. Mauritius u. Seychellen, 1880, p. 340 (radula); Smith, Fauna and Geogr. Maldive and Laccadive Arch. i, part 2, 1902, p. 143.
Bulimina (Rachis) punctata, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 285.
Rachisellus punctatus, Bourguignat, Moll. Afr. Equat. 1889, p. 69; Thiele, Wiss. Ergebn. Deuts. Zentr.-Afr. Exp. iii, Zool. 1911, p. 201.
Rachis punctatus, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 297.
Rhachis punctata, Kobelt & Möllendorff, Nachr. Deuts. Malak. Ges. 1903, p. 38.
Buliminus (Rachis) punctatus, Peile, Journ. Bombay Nat. Hist. Soc. xi, 1908, p. 131.
Bulimus solutus, Benson MS. quoted by Pfeiffer and Deshayes.
Bulimus solatus, Benson MS. quoted by Reeve.

Original description:—"Oval-conisch, Gewinde mässig lang; 6 flache Windungen; wenig glänzend, glatt, weiss, fein braun punctirt, auf der Mitte der letzten Windung ein schmales braunes Band, Wirbelspitze schwarz, glänzend; durchbohrt; Mündung lang oval; Mundsaum scharf; Spindel mit einem Blättchen belegt." (*Anton.*)

Length 10, diam. 5 mm. Apert. 4·5 mm. long, 3 broad.

Hab. India: Bundelkhund (*Benson, Jerdon, Mus. Cum.*); Oolooberiah, near Calcutta and Benares (*Mainwaring*); Madras (*Henderson*); Poona, Ahmednuggar (*Blanford*); Trichinopoly, Nullamullays (*Blanford*); Travancore (*Beddome*); Orissa (*Ball*); Bombay Island (*Peile, West*). Ceylon (*Layard, Nevill*). Laccadive Archipelago (*Stanley Gardiner Exp.*). Africa: Zanzibar (*Vesco, von der Decken, Brauns*); Mozambique: Tette and Querimba Island (*Peters*); Benguella (*Ansorge*).

No habitat was given originally by Anton, Benson being the first to identify specimens as *B. punctatus* from Bundelkhund and Ceylon as recorded by Pfeiffer and Reeve. Many other Indian localities were indicated subsequently by Nevill, while in 1860 von Martens and Morelet recorded specimens from Zanzibar, the former adding Mozambique in 1869. He mentioned that shells from Zanzibar were contained in Albers' collection, but they were labelled *B. Ferussaci*, Dunker, adding that the true West African *ferussaci*, indeed, scarcely differs from *punctatus*, except in the white coloration and pale apex. He draws attention, however, to the fact that Pfeiffer attributes a corneous apex to *punctatus*,

whereas the descriptions by Anton and Reeve agree with his specimens from Mozambique and Ceylon in having a black or blackish apex. The specimens from Querimba Island, he states, are somewhat larger—15 mill. long and 7 broad—and are more whitish than those from Tette. The shells recorded in 1860 by von Martens were obtained from Herr W. Branns, an oil manufacturer, who picked them out, together with many other species, from Sesamum seed received in large quantities from Zanzibar. In addition to normal specimens, he observed one form, very conspicuous on account of the width and size of the aperture, the measurements being: length 22·5 mm., maj. diam. 8, length of aperture 7, but which otherwise agreed with *punctatus*, more especially as regards coloration and markings. Amongst numerous specimens of this species he invariably found but a single distinct band, but frequently in addition some ill-defined band-like shading at the base. Again, in dealing with *R. ferussaci* *, he alludes to its close resemblance to E. African and Indian specimens of *R. punctatus*, stating that the latter is somewhat more slender, but differs especially in the last whorl and the aperture, the colouring and marking being similar, although a little darker.

With regard to banding, *R. punctatus* is certainly the most constant, as among the numerous specimens which have passed through my hands, I have not in a single instance observed the one infra-peripheral band missing, but occasionally it is interrupted by the transverse streaks. Now and again there may be an indication of a second band below it, as in some shells from Pulney received by Mr. Leman from the late Robert Cairns' collection; the same may be observed in some shells obtained by the Stanley Gardiner Expedition in S. Mahlos Atoll, Maldive Archipelago. Many specimens from Travancore are strongly marked with transverse fuscous streaks. Some shells received by the British Museum from Hutton, from the plains of India, are characterized by a dark zone on the columella. In size *R. punctatus* varies considerably: Hutton's shells measuring 13×6 mm., some Bombay specimens received from A. A. West 14·5×5·5 mm., others from Bundelkhund in the Cuming collection reaching 15×6 mm., and shells from Madras, sent by J. R. Henderson, 16×6 mm., while three specimens collected by Pirrie in the Koondah Mountains attain 21×9 mm. The latter were labelled *B. ferussaci* by Pfeiffer. Finally, it appears worth while to place on record three specimens collected in Benguella by Dr. Ansorge, and acquired by the British Museum. These can only be distinguished from typical *punctata* by the larger size—the largest measuring 23×11·5 mm.—and by the more distinctly angulated umbilicus. They are creamy white with a pale fuscous infra-peripheral band and minute spots.

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* Jahrb. Deuts. Malak. Ges. ix, 1882, p. 247.

Genus EDOUARDIA (*nom. mut.*).

Conulinus, von Martens, Nachr. Deuts. Malak. Ges. xxvii, 1895, p. 180 (section of *Buliminus*, for *B. ugandæ*, *hildebrandti*, and *metula*, no definition), not *Conulina*, Bronn, 1835; ibid., Besch. Weichth. Deutsch-Ost-Afrikas, 1897, p. 64 (as section of *Buliminus*, type *B. conulus*, Pfeiffer).

Type, *Bulimus conulus*, Pfeiffer.

Range. East Africa. India (one species).

Rounded conical, with comparatively small last whorl, weak sculpture; generally brown, often somewhat shining; peristome with outer and lower margins straight; columellar margin reflexed, frequently rather oblique in relation to the axis, without fold.

Anatomy unknown.

The name *Conulina*, proposed by Bronn in 1835 for a genus of Polyzoa, being easily confused with *Conulinus*, I feel compelled to change the latter and I have associated with the genus the first name of that able malacologist, the late Professor Edouard von Martens, for so many years in charge of the Mollusca section of the Berlin Museum. To this genus I refer the only known species from India, which does not assimilate with any known Indian group, but closely approximates, conchologically, to the African forms. At the outset there is nothing improbable about this distribution of the genus in view of the fact that India and East Africa share, besides, such species as *Cerastus abyssinicus*, *Pupoides cœnopictus*, and *Zootecus insularis*.

247. Edouardia orbus, *Blanford*.

Bulimus orbus, Blanford, J. A. S. B. xxx, 1861, p. 361, pl. 1, fig. 14; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 150; Hanley & Theobald, Conch. Ind. 1870, pl. 20, fig. 1.

Buliminus (*Rhachis*) *orbus*, Nevill, Hand List, i, 1878, p. 130; Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 667, pl. 102, fig. 7.

Bulimina (*Hapalus*) *orba*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 299.

Original description :—"Testa subperforata, oblongo-turrita, cornea, tenuis, oblique striatula; spira conica, apice obtusiuscula, sutura impressa. Anfr. 7 convexi, ultimus $\frac{1}{3}$ longitudinis subæquans. Apertura obliqua, rotundato-ovalis; peristoma simplex, rectum, marginibus convergentibus, dextro arcuato, ad anfr. penultimum valde antice porrecto, columellari breviter reflexo, perforationem subtegente.

"Long. 10, diam. 5 mm. Ap. $3\frac{1}{4}$ alta, $2\frac{1}{2}$ lata." (*Blanford.*)

Hab. India: Cullygoody, near Trichinopoly (*Blanford*); Poona and Ahmednuggar (*Blanford*, *Fairbank*).

"We are not acquainted with any Indian type of *Bulimus* to which the shell can be compared. Its horny texture, elevated,

conical spire, and rounded mouth, with the upper margin of the thin peristome running to a considerable distance forward along the penultimate whorl, form a very peculiar combination of characters." (*W. T. & H. F. Blanford.*)

Three specimens in the Cuming collection have 7½ whorls, one measuring 13·5 × 6 mm.; they are dark greyish corneous, and finely obliquely striated. Two shells in the Theobald collection, without locality, have 6½ whorls and measure 9 mm. in length, while three others from Ahmednuggar, in the same collection, are pale corneous and measure 13·5 × 6 mm. The British Museum possesses, besides, two specimens from Poona, reeeived in 1868 from A. West; these are also pale corneous.

Family PUPILLIDÆ.

Genus **PUPILLA**, *Turton.*

Pupilla (Leach), in Turton, Man. Land and Freshw. Shells, 1831, p. 99; Beck, Index Moll. 1838, p. 83 (as subgenus of *Pupa*); Pfeiffer, Malak. Blätt. ii, 1856, p. 176 (as section of *Pupa*): von Martens, Die Heliceen, ed. 2, 1860, p. 290 (as subgenus); Locard, Prod. Malac. Française, 1882, p. 173; ibid., Coq. terr. de France, 1894, p. 327; Dall, Nautilus, xvii, 1904, p. 115; Cockerell, op. cit. xviii, 1905, p. 104; Pilsbry, tom. cit. pp. 105 & 116; Dall, tom. cit. p. 114; Kennard & Woodward, List Brit. Non-Marine Moll. 1914, p. 2.

Pupa, Draparnaud, 1801, and subsequent authors (not *Pupa*, Humphrey, 1797, Bolten, 1798, Lamarck, 1801); Lehmann, Leb. Schn. Musch. Stettins, 1873, p. 144, pl. 14, fig. 50 (anatomy *P. muscorum*).

Jaminia, B. B. Woodward, Journ. Conch. x, 1903, pp. 354, 360 (not *Jaminia*, Risso, 1826).

Type, *Turbo muscorum*, Linné.

Range. Europe, Asia, Africa.

Shell small, shortly cylindrico-ovate, frequently rather solid; spire convex, apex obtuse; whorls compact, the last not or scarcely wider than the penultimate. Aperture semi-ovate, usually with one or more denticles and occasionally with spiral folds. Umbilicus oblique, narrow.

The name *Pupa* was used almost universally for this genus until, in 1903, Mr. B. B. Woodward pointed out that it was not available for this group, when he substituted *Jaminia* for it. Dr. Dall, Prof. Cockerell, and Prof. Pilsbry subsequently shed additional light upon the subject, establishing the fact that *Jaminia* could not be used in lieu of *Pupa* either, but that *Pupilla*, first published by Turton in 1831, had to be adopted, and this course was followed by M. Louis Germain in Moll. de la France et des regions voisines, ii, 1913, p. 184, and by Kennard and

Woodward, in their 'List of British Non-Marine Mollusca,' (1914). The name *Pupilla*, had, indeed, already previously been used generically, *i. e.*, by Morse in 1864, and Locard in 1882, but only in its restricted sense for *P. muscorum* and its immediate allies.

"Animal usually slender, body attenuated posteriorly, the eye-bearing tentacles moderately long, cylindrical, somewhat thickened at the extremities, the lower tentacles very small.

"Jaw (*P. muscorum*) flatly semilunate, with pointed angles, almost horizontal, the convex margin slightly thickened, transparent, whitish yellow, without perceptible striation, very short and narrow.

"Radula foliolate anteriorly, stalked posteriorly, ½ mm. long, ⅛ mm. wide, with 31 longitudinal and 90 transverse rows of teeth. The central tooth equals the lateral in size, is symmetrical, with truncated base and tri-cuspid. The middle cusp is broadly conoid, the side cusps small but pronounced. The laterals become bi-cuspid, and in the outer longitudinal rows comb-like 3–4 cuspid.

"The hermaphrodite gland is connected by a filiform winding hermaphrodite duct with the spermoduct. The latter proceeds by the side of the uterus taking up the vas deferens, which is 1·5 mm. long and enters the penis distally, the latter being prolonged into a whip-like appendix, 2 mm. long. A short retractor muscle proceeds from the penis below the junction of the latter with the appendix. The penis is cylindrical for 0·5 mm. of its length below the retractor muscle, and close to its entering the cloaca, it is provided with a second whip-like appendix 1·5 mm. in length, which is cylindrically dilated below, then becomes filiform, and again dilates, its terminal portion being long club-shaped. The albumen gland is broadly lingulate, short; the uterus broad, with a moderately long vagina into which the stalk of the ovate spermatheca terminates." (*Lehmann.*)

The Indian forms, unfortunately, have not been investigated anatomically, at least nothing has been published on the subject.

Two species—*P. brevicostis* and *P. salemenensis*—will, I believe, when they come to be examined, be found to differ from typical *Pupilla*.

248. Pupilla muscorum, *Linné*.

Turbo muscorum, Linné, Syst. Nat. ed. 10, 1758, p. 767.
Helix muscorum, Müller, Verm. Terr. Fluv. ii, 1774, p. 105.
Pupa muscorum, Lamarck, Anim. sans vert. vi, part 2, 1822, p. 111; Deshayes, Encycl. Méth., Vers, ii, 1830, p. 405; ibid., Anim. sans vert. ed. 2, viii, 1838, p. 180; Küster, Conch.-Cab., *Pupa*, 1841, p. 12, pl. 2, figs. 1–5; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 311; Hanley, Ipsa Linn. Conch. 1855, p. 352, pl. 4, fig. 6; Theobald, J. A. S. B. xlvii, 1878, p. 146; Pilsbry, Naut. v, 1891, p. 45.

Pupa marginata, Draparnaud, Tabl. Moll. France, 1801, p. 58; ibid., Hist. Nat. Moll. France, 1805, p. 61, pl. 3, figs. 36–38; Turton, Man. Land & Freshw. Shells British Islands, 1831, p. 99.

Pupilla marginata (Leach), Turton, op. cit. p. 99 (as synonym of *Pupa marginata*).

Pupa (*Pupilla*) *marginata*, Gray in Turton, op. cit. new edit. 1840, p. 196, pl. 7, fig. 79.

Pupilla badia (Adams), Morse, Journ. Portland Soc. Nat. Hist. i, 1864, p. 37, fig. 89 (shell), fig. 91 (jaw), pl. 10, fig. 92 (radula).

Pupilla muscorum, Morse, tom. cit. p. 37, fig. 90.

Pupilla muscorum, Germain, Moll. France & Rég. Vois. ii, 1913, p. 185; Kennard & Woodward, List Brit. Non-Marine Moll. 1914, p. 8.

Shell perforate, subcylindrical, rather solid, opaque, light brown or yellowish corneous, finely and closely striated. Spire short, apex obtuse, suture moderately deep. Whorls 6–7, increasing slowly and regularly, the last rather suddenly, slightly convex. Aperture roundly ovate, truncated above; peristome thickened and margins reflexed, with a strong whitish rib or crest externally, the margins approaching and united by a thin parietal callus, upper margin shortly curved, outer and basal margins rounded, columellar margin obliquely ascending, almost straight. The parietal wall is usually provided with a small denticle. Umbilicus narrow.

Length 3–3·25 mm., diam. 1·75 mm.

Hab. Circumpolar.

Var. asiatica, *Möllendorff.*

Pupilla muscorum, subsp. *asiatica*, Möllendorff, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersburg, vi (1901), 1902, p. 381.

"Always toothless, usually more slender, palatal crest less developed." (*Möllendorff.*)

Hab. India: Kashmir (*Theobald*); W. Himalayas (*Stoliczka*). Central Asia (*Stoliczka*, *Potanin*, *Fedtschenko*, *Przewalski*). China (*Potanin*, *Loczy*, *Möllendorff*).

The shells recorded by Theobald as *Pupa muscorum*, from Kashmir, probably belong here.

249. Pupilla eurina, *Benson.*

Pupa eurina, Benson, A. M. N. H. ser. 3, xiii, 1864, p. 139; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 300; Hanley & Theobald, Conch. Ind. 1875, pl. 101, fig. 7.

Pupa (*Pupilla*) *eurina*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 353.

Original description:—"P. testa perforata, ovato-cylindrica, solidiuscula, suboblique striatula, rufo-castanea, nitidula; spira ovato-cylindrica, apice obtuso, sutura impressa, submarginata; anfractibus 7–7½, convexis, ultimo antice ascendente; apertura

semiovata, subobliqua, edentula; peristomate expansiusculo, albido, margine dextro extus postice incrassato.

"Long. 2½, diam. 1 mill." (*Benson.*)

Hab. India: Tribeni Ghat, Nepal (*Theobald*).

Eight specimens from the Benson collection at Cambridge, sent to me for inspection by Dr. L. Doncaster, agree with the figure of the species in Conch. Ind., but the columellar margin is more obliquely ascending than is shown in the figure. They vary in length between 3 and 3·5 mm. The shell somewhat resembles a large *P. seriola*.

250. **Pupilla seriola**, *Benson.*

Ennea seriola, Blanford, J. A. S. B. xxx, 1861, p. 359 (nom. nud.).

Pupa seriola, Benson, A. M. N. H. ser. 3, xii, 1863, p. 427; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 304; Hanley & Theobald, Conch. Ind. 1875, pl. 101, fig. 8.

Pupa (Pupilla) seriola, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 354.

Original description:—"P. testa vix perforata, ovato-oblonga, subcylindrica, oblique striatula, sericina, flavescente, cornea; spira oblonga, apice obtusiusculo, sutura impressa; anfractibus 5, superioribus convexis, ultimo convexiusculo, antice vix ascendente; apertura subovata, superne angulata, dente 1 parietali mediano remotiusculo induta; peristomatis marginibus callo tenui junctis, dextro vix, columellari superne late expanso.

"Long. 2½, diam. 1⅓ millim." (*Benson.*)

Hab. India: Orissa, Cuttack (*Theobald*).

I have not seen this species. Judging from the figure in Conch. Ind. it is allied to *P. eurina*, Benson.

251. **Pupilla diopsis**, *Benson.*

Pupa diopsis, Benson, A. M. N. H. ser. 3, xii, 1863, p. 427; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 306; Hanley & Theobald, Conch. Ind. 1875, pl. 101, fig. 10.

Pupa (Pupilla) diopsis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 354.

Original description:—"P. testa perforata, oblongo-ovata, oblique striatula, striis nonnulis remotis elevatiusculis, sub epidermide cornea albida; spira oblonga, versus apicem obtusiusculum conoidea, sutura impressiuscula; anfractibus 5 convexiusculis, ultimo antice leviter ascendente; apertura oblongo-ovata, superne angulata, bidentula, plica parietali mediana angusta oblique intrante denteque columellari obliquo remoto superne munita; peristomate tenui, margine dextro simplici recto, columellari expanso.

"Long. 2, diam. 1 mill." (*Benson.*)

Hab. India: Nerbudda Valley.

252. **Pupilla gutta**, *Benson.*

Pupa gutta, Benson, A. M. N. H. ser. 3, xiii, 1864, p. 138; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 298; Hanley & Theobald, Conch. Ind. 1875, pl. 101, fig. 9; Theobald, J. A. S. B. xlvii, 1878, p. 146.
Pupa (*Pupilla*) *gutta*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 353.

Original description:—" P. testa obsolete rimata, oblongo-ovata, lævigata, tenui, pallide cornea, translucente; spira obtuse ovata, sutura impressa; aufractibus $4\frac{1}{2}$, convexiusculis, ultimo antice vix ascendente; apertura obliqua, edentula, angulato-rotundata; peristomatis marginibus remotis, dextro recto, acuto, columellari expansiusculo.

" Long. $1\frac{2}{3}$, diam. 1 mill." (*Benson.*)

Hab. India: Spiti Valley, Kunawur (*Benson*).

" *P. himalayana*, Hutton, an elongate and strongly sculptured shell, is the only edentate species previously described from the Himalayan Region." (*Benson.*)

I have not seen this species. The shell figured in Conch. Ind. does not look as if mature, and the fact that Benson in his diagnosis describes the right margin of the peristome as " straight, acute," makes it appear that the same remark applies to the type. It does not seem to have much affinity with *Sphyradium himalayanum* (*ante* p. 41).

253. **Pupilla barrackporensis**, *nom. mut.*

Pupa indica, Pfeiffer, P. Z. S. 1854, p, 295 (not *Pupa indica*, Benson, 1849); Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 679; Hanley & Theobald, Conch. Ind. 1876, pl. 160, fig. 8; Sowerby, Conch. Icon. xx, 1876, *Pupa*, pl. 7, fig. 63.
Pupa (*Pupilla*) *indica*, Pfeiffer, Malak. Blätt. ii, 1856, p. 177; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 355.

Original description:—" P. testa breviter rimata, cylindraceo-ovata, tenui, levissime striatula, oleoso-micante, fulvo-cornea; spira apice conoideo-rotundata; anfract. 5, superis 3 convexis, penultimo planiore, ultimo $\frac{1}{3}$ longitudinis formante, basi compresso, antice biscrobiculato; apertura vix obliqua, oblonga, dentibus 4 coarctata: 1 plicæformi parietali, 1 columellari, 2 profundus, brevibus palatalibus; perist. albido, breviter expanso.

" Long. 2, diam. 1 mill." (*Pfeiffer.*)

Hab. India: Barrackpore.

The name *Pupa indica*, proposed by Pfeiffer in 1854, is not available for the present species having already been employed by Benson in 1849, and I have therefore been obliged to substitute a new one.

The McAndrew collection at Cambridge contains several specimens labelled *brevicostis*, but which I refer without hesitation to the present species, having compared them with the type in the Cuming collection. Nevill, when stating that he considered these

two species identical * may possibly have had specimens of *barrackporensis* [*indica*, Pfr., non Benson] labelled *brevicostis* before him, and was thus misled. The two are perfectly distinct as will be seen on comparison of the figures.

254. **Pupilla cinghalensis**, sp. n.

Shell narrowly perforate, almost rimate, cylindrical-ovate, rather solid, very minutely striatulate, the earlier whorls corneous, the later ones rufous. Spire convex, apex obtuse, suture impressed. Whorls 5, slightly convex, the last flattened and scrobiculate behind the peristome, shortly ascending, slightly compressed and subangulated around the extremely narrow perforation of the umbilicus. Aperture oblique, broadly obovate, furnished with seven denticles: 2 compressed, elongate, on the parietal wall, 2 very minute and deeply seated, on the columella, 3 also very

Fig. 103.—*Pupilla cinghalensis.*

minute and deeply seated, on the palatal wall. Peristome rufous, slightly thickened and reflexed; outer margin slightly inflexed, basal margin rounded, columellar margin obliquely ascending and slightly dilated above.

Long. 2, diam. 1 mm.

Hab. Ceylon. Type in the British Museum.

This new species is based on a specimen from Ceylon, without precise indication of habitat, acquired by me some years ago at a sale. It differs from *P. barrackporensis*, its nearest ally, in having seven instead of four denticles in the aperture, and in having the peristome fulvous instead of white.

255. **Pupilla muscerda**, *Benson.*

Pupa muscerda, Benson, A. M. N. H. ser. 2, xii, 1853, p. 94; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 680; Nevill, Enum. Helic. Ceylon, 1871, p. 3; Hanley & Theobald, Conch. Ind. 1876, pl. 160, fig. 2; Sowerby, Conch. Icon. xx, 1876, *Pupa*, pl. 7, fig. 56.

Pupa (Pupilla) muscerda, Pfeiffer, Malak. Blätt. ii, 1856, p. 177; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 355.

Pupa (Vertigo) muscerda, Nevill, Hand List, i, 1878, p. 198.

Original description:—"Testa rimata, ovato-oblonga, striatula, cornea, spira elongata, apice obtuso; anfractibus 5½–6, convexius-

* Hand List, i, p. 197.

culis, ultimo tertiam partem testæ æquante, vix ascendente; apertura ovata, tridentata, peristomate expanso, acuto, marginibus conniventibus, columellari dilatato, albido, plica parietali 1, columellari 1, profundiusculis, dente palatali 1, depresso, obtuso.

"Long. 4, diam. 1½ mill." (*Benson.*)

Hab. Ceylon: Cape Pedro (*Layard*); Baticalva (*Preston*); Jaffna (*Linter*). India: Erode (*Beddome*).

"In old posts and on Palmyra trees (*Borassus flabelliformis*)."

The present species resembles *cœnopicta* in shape and contour, but can be readily distinguished by the more acute apex, the slightly inflexed outer margin, and especially by the presence of the teeth in the aperture. In the Beddome collection I found a considerable number intermixed with *Pupoides cœnopicta*, collected at Erode. The British Museum contains four specimens from Cape Pedro, which are probably a part of the original lot, as they are accompanied by a label in the late Edgar Layard's handwriting; one of these measures 4·5 mm. in length. There are, besides, six shells presented by Mr. H. B. Preston, who collected them at Baticalva. I have also seen five specimens in the late Miss Linter's collection, now in the Royal Albert Memorial Museum, Exeter, which, with other shells in the same collection, were kindly forwarded to me by the curator, Mr. F. R. Rowley. These measure 4·25 × 2 mm., and are labelled "Jaffna."

256. **Pupilla filosa**, *Theobald & Stoliczka.*

Pupa filosa, Theobald & Stoliczka, J. A. S. B. xli, 1872, p. 333, pl. 11, fig. 8; Hanley & Theobald, Conch. Ind. 1876, pl. 160, fig. 5; Sowerby, Conch. Icon. xx, 1876, *Pupa*, pl. 7, fig. 59; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 401.

Pupa (*Vertigo*) *filosa*, Nevill, Hand List, i, 1878, p. 196.

Pupa (*Vestigo* (*Alaea*)) *filosa*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 359.

Original description:—"P. testa ovato-cylindracea, cornea, pellucida, apice obtusiuscula, rimate umbilicata; anfractibus 4½ convexiusculis, sutura simplici junctis, transversim striis cuticularibus, obliquis, filiformibus ornatis; ultimo spira breviore, basi vix angustato, convexiusculo; apertura subquadrangulari, recta, intus dentibus quinque instructa, labro undique paulo expansiusculo, atque incrassato, infra suturam subangulato, ad latus dentibus duobus parvis profunde sitis instructo; labio tenuissimo, prope medium dentibus pliciformibus duobus approximatis, antiore multo minore, prædito; columella unidentata.

"Long. 2, diam. max. 1 mm.; apert. cum perist. 0·75 longa, antice 0·55, postice 0·75 mm. lata." (*Theobald & Stoliczka.*)

Hab. Burma: Arakan (*Theobald*).

"A well marked species, both by its peculiarly subcylindrical shape and by the denticulations of the apertural margins; it is not uncommon on the Arakan coast."

In addition, the strong and close costulation differentiates *P. filosa* from its nearest allies.

257. Pupilla brevicostis, *Benson.*

Pupa brevicostis, Benson, A. M. N. H. ser. 2, iv, 1849, p. 127; Küster, Conch.-Cab., *Pupa*, 1852, p. 136, pl. 17, figs. 20–22; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 560.
Vertigo (Alæa) brevicostis, Adams, Gen. Rec. Moll. ii, 1855, p. 172.
Pupa (Vertigo) brevicostis, Pfeiffer, Malak. Blätt. ii, 1856, p. 177; Nevill, Hand List, i, 1878, p. 197.
Pupa (Pupilla) brevicostis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 355.

Original description:—"T. rimato-perforata, cylindraceo-ovata, cornea, apice obtuso; anfractibus 4½, longitudine celeriter crescentibus; ultimo antice non ascendente, ⅓ longitudinis testæ æquante, superioribus convexis, superne remote semicostulatis, ultimo et penultimo subplanulatis, dimidioque inferiori cæterorum sericeis, mutius; apertura rotundato-ovata, 5–6 plicata; plica 1 angulari, brevi: secunda parietali, profundiore, obliqua; columellari unica; palatalibus 2–3 profundis; peristomate expanso, subreflexo.

"Long. 1½ mill., lat. vix 1 mill." (*Benson.*)

Hab. India: Barrackpore, Bengal (*Bacon*).

"Taken by Dr. J. F. Bacon on the trunk of a tamarind tree at the Cantonment of Barrackpore, near Calcutta, during the rainy season of 1848. Out of several individuals forwarded to me overland, by letter in a quill, two reached me alive, and creeping about when supplied with moisture enabled me to verify their affinities. The lower pair of tentacula is deficient or inconspicuous, as in *Vertigo*; the upper pair carry the eyes at their summits; the shell is often carried at an angle of 45°." (*Benson.*)

Fig 104.—*Pupilla brevicostis.* $\frac{12}{1}$.

Nevill (Hand List, i, p. 197) was of opinion that *Pupa indica*, Pfeiffer [*barrackporensis*, mihi] and the present species were identical. A comparison of specimens does not bear out this view, as Pfeiffer's species is larger and more cylindrical, the suture is deeper, it has half a whorl more, and is provided only with four plicæ in the apertum.

The figure given by Küster is not a very good representation of the shell, and as this is the only one published I have considered it desirable once more to illustrate the species from a specimen in

the Cuming collection in the British Museum, measuring 1·75 × 1·1 mm. The type cannot, unfortunately, be found, Dr. Doncaster informing me that a diligent search for it has proved fruitless. The species is characterized by the lamellate striæ and the short spire as compared with the diameter.

The true position of this species is somewhat doubtful. Adams, Pfeiffer, and Nevill placed it in *Vertigo*, doubtless owing to Benson's observation that "the lower pair of tentacula is deficient or inconspicuous, as in *Vertigo*." As the latter is characterized by the absence of the lower pair of tentacles and Benson does not definitely state that these organs are absent in the species, the reference to *Vertigo* does not seem warranted, especially since the shell does not, as regards texture, shape, and conformation, assimilate well with the other forms of that genus. Pfeiffer appears to have modified his original opinion, for in the 'Nomenclator' the species was placed in the section *Pupilla* of the genus *Pupa*. While its inclusion in the group of *P. muscorum* is out of the question, *brevicostis* may be retained in the genus *Pupilla* in its wider sense, as now understood, until an investigation of its anatomy shall prove the contrary.

258. **Pupilla salemensis,** *Blanford.*

Ennea salemensis, Blanford, J. A. S. B. xxx, 1861, p. 359.
Pupa salemensis, Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 318; Hanley & Theobald, Conch. Ind. 1876, pl. 160, fig. 9.
Pupa salemanensis, Sowerby, Conch. Icon. xx, 1876, *Pupa,* pl. 7, fig. 62.
Pupa (Pupilla) salemensis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 354.

Original description:—"Testa rimata, ovato-oblonga, oblique striata, fulvida: spira elevata, conoidea, apice obtuso: sutura impressa; anfr. 4½; superiores convexiusculi, inferiores subplanulati, ultimus pone aperturam medio excavatus, ⅖ longitudinis subæquans, antice arcuatim ascendens, juxta suturam et infra compressus. Apertura reniformis; columella recedens, superne callosa. Dentes parietales 2 compressi. Peristoma expansum, labio externo flexuose excavato 1 dentato.

"Long. 1·6, diam. maj. 1, apert. alt. 0·6 mm." (*Blanford.*)

Hab. India: Kalryen Hills (*Foote*).

"This little shell belongs to a type distinct from that of *Ennea pirriei* and the other S. Indian species, and is more closely allied to the Cuttack sp. *E. seriola*. From this it is distinguished by its more conoidal form and the possession of two well-developed parietal, and one palatal tooth, whereas the Cuttack shell has but one minute parietal tooth. Moreover, the mouth is smaller and more constricted. Two specimens were received from Mr. Foote, both somewhat weathered." (*Blanford.*)

Benson states * that it has more affinity with *Bulimus.* In one of the two specimens received by him the parietal lamina was not apparent. I have not seen specimens, but to judge from the figure in Conch. Ind. neither Blanford nor Benson appears to me to have been happy in their comparison, as *salemensis* seems much nearer to *brevicostis.*

Genus BIFIDARIA, *Sterki.*

Bifidaria, Sterki, Nautilus, vi, 1892, pp. 4, 99 (as subgenus of *Pupa*); Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, 1900, p. 590 (as genus of *Pupidæ*).

TYPE, (1st species) *Pupa hordeacea,* Gabb.

Range. North and Central America, North Coast of South America, West Indies, Bermudas, Eastern Asia, Islands of the Pacific and Indian Seas.

Shell small, few exceeding 3 mm. in height, varying in shape from cylindric and turriculate, to conic and ovoid. Colour lighter or deeper corneous, chestnut or whitish. Surface smooth, polished, finely striate, or with fine ribs. Parietal lamella more or less complex, composed of a parietalis—inner—and supraparietalis—outer, or angular—almost separate, side by side in some species, united to almost a simple one in others, comparatively small in some, the supraparietal very small or almost obsolete in others. The columellar lamella, equally constant, is generally also somewhat complex. Typical inferior and superior palatal plicæ always present, sometimes quite small, as a rule deep-seated, never reaching the margin; in some species one or the other is in a peculiar oblique position. Generally, but not always, there is a tooth or short fold at the base. In many species additional dentiform or lamelliform plicæ, sometimes very small, are found; one on the parietal wall, between the parietal and the columella, constant or inconstant, one above the upper palatal, one between the two palatals, inconstant. (*Sterki.*)

259. Bifidaria bathyodon, *Benson.*

Pupa bathyodon, Benson, A. M. N. H. ser. 3, xii, 1863, p. 426; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 326; Hanley & Theobald, Conch. Ind. 1874, pl. 100, fig. 7; Sowerby, Conch. Icon. xx, 1876, *Pupa,* pl. 4, fig. 33, pl. 16, fig. 152.
Pupa (Scopelophila) bathyodon, Nevill, Hand List, i, 1878, p. 192.
Pupa (Pupilla) bathyodon, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 355.

Original description:—"P. testa profunde rimato-perforata, ovato-conica, oblique striatula, fusco-cornea, translucente; spira

* A. M. N. H. ser. 3, xii, 1863, p. 428.

conica, apice obtuso, sutura subprofunda; anfractibus 5, convexis, ultimo antice ascendente circa umbilicum excavatum compressiusculo; apertura quadrato-ovata, marginibus, expansis subreflexis concoloribus callo parietali expanso superne junctis, 4-dentata, dente parietali 1 entrante majore, palatalibus 2 minutis remotiusculis, columellari 1 profundo.

"Alt. 3, diam. 2 mill." (*Benson.*)

Hab. India: Teluk Sendur, near Hoshungabad, not far from the Nerbudda River (*Theobald*); Mul River, Western India (*Theobald*).

This appears to be a rare form. I have not seen specimens. Benson in his diagnosis states that there are four denticles, one being columellar, but the figure in Conch. Ind. shows five, two of which are situate on the columella.

260. **Bifidaria huttoniana**, *Benson.*

Pupa huttoniana, Benson, A. M. N. H. ser. 2, iv, 1849, p. 126; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 550; Hanley & Theobald, Conch. Ind. 1875, pl. 101, fig. 3; Theobald, J. A. S. B. xlvii, 1878, p. 146.

Pupa (*Pupilla*) *huttoniana*, Adams, Gen. Rec. Moll. ii, 1855, p. 169.

Pupa (*Leiostyla*) *huttoniana*, Pfeiffer, Malak. Blätt. ii, 1856, p. 176.

Pupa (*Vertigo*) *huttoniana*, Nevill, Hand List, i, 1878, p. 197.

Carychium boysianum, Benson (*fide* Stoliczka), MS., Nevill, Hand List, i, 1878, p. 197.

Pupa (*Vertigo* (*Alaea*)) *huttoniana*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 358.

Original description:—"Testa rimata, ovato-obliqua, subcylindracea, hyalina, glabra, apice obtuso; anfractibus 5, convexis; apertura ovato-rotundata, quinqueplicata; peristomate expansiusculo, marginibus callo tenui junctis; plica unica irregulari, sinuata, parietalis, columellaribus duobus, palatalibus duobus profundis.

"Long. 1½ mill., lat. vix 1 mill." (*Benson.*)

Hab. India: Simla (*Hutton*); Sind (*Blanford*); Kashmir and Deccan (*Stoliczka*); Ahmednuggar (*Theobald*); Wadalé (*Fairbank*); Kashmir: Panjal Range (*Theobald*).

Some shells from Simla in the Theobald collection are referred here with some doubt. The parietal plica is bifid and in some specimens there is an additional plica nearer the columella; others have only one columellar plica. The shells range in length from 1·75 to 2 mm. A number of *himalayana* from Simla, presented to the British Museum by Hutton in 1856, comprised a specimen of *huttoniana*. The Beddome collection also contains ten shells of *huttoniana* collected in Kashmir by Stoliczka; these have likewise a bifid parietal plica, while a single columellar plica occurs in some and two in others.

261. **Bifidaria avanica**, *Benson.*

Pupa avanica, Benson, A. M. N. H. ser. 3, xii, 1863, p. 428; Blanford, J. A. S. B. xxxiv, 1865, p. 95; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 335; Hanley & Theobald, Conch. Ind. 1876, pl. 160, fig. 7: Sowerby, Conch. Icon. xx. 1876, *Pupa*, pl. 7, fig. 60
Pupa (*Vertigo*) *avanica*, Nevill, Hand List, i, 1878, p. 197.
Pupa (*Pupilla*) *avanica*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 355.

Original description:—"P. testa umbilicata, ovato-oblonga, subcylindrica, vix striatula, nitida, fusco-cornea, translucente; spira oblonga, versus apicem obtusiusculum conica, sutura valde impressa; anfractibus 5½, subconvexis, ultimo antice ascendente; apertura ovata, superne obtusa sexdentata, plica parietali 1 duplicata, intrante, dentibus columellaribus 2 profundis et palatalibus 3 profundis munita; peristomate undique expanso, marginibus tenuibus callo parietali lato junctis.

"Long. 2½, diam. 1⅓ mill." (*Benson.*)

Hab. Burma: Ava (*Theobald*); Mandalay (*Blanford*).

The species is characterized by the very convex whorls and the deep suture, resembling *mimula* in that respect, but it is more conoid and the last whorl becomes more contracted, while in *mimula* the aperture is more rotundate. A specimen in the Hungerford collection in the British Museum shows a slight additional parietal denticle nearer the columella. A shell in the Beddome collection has only two palatal plicæ.

262. **Bifidaria mimula**, *Benson.*

Pupa mimula, Benson, A. M. N. H. ser. 2, xii, 1853, p. 95; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 676; Nevill, Enum. Helic. Ceylon, 1871, p. 3; Hanley & Theobald, Conch. Ind. 1876, pl. 160, fig. 4; Sowerby, Conch. Icon. xx, 1876, *Pupa*, pl. 7, fig. 61.
Pupa (*Leiostyla*) *mimula*, Pfeiffer, Malak. Blätt. ii, 1856, p. 176.
Pupa (*Vertigo*) *mimula*, Nevill, Hand List, i, 1878, p. 198.
Pupa (*Vertigo* (*Alaea*)) *mimula*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 358.

Original description:—"Testa rimata, ovato-oblonga, subcylindracea, oblique tenuiter plicatula, pallide cornea, apice obtuso, sutura profundiuscula; anfractibus 5, convexis, ultimo vix ascendente; apertura ovata, verticalis, 5-plicata, peristomate tenui, expanso, marginibus callo tenui expanso junctis, plica 1 intrante, majuscula, parietali, 1 columellari, 1 basali profunda, 2 palatalibus profundis.

"Long. 2, diam. 1 mill." (*Benson.*)

Hab. Ceylon: Cape Pedro (*Layard*).

"Nearly allied to and somewhat larger than the Himalayan *P. huttoni*, Nobis." (*Benson.*)

A well-characterized form. The parietal lamella is compressed and largest of all, the columellar one being somewhat smaller, while the three palatals are very minute. I have seen four

specimens in the British Museum, recently acquired by purchase, which are from Cape Pedro, and are accompanied by a label in the late Edgar Layard's handwriting; they are in all probability some of the original lot. There are, besides, three shells in the Hungerford collection and eight in the Theobald collection, so that the species appears fairly common.

263. **Bifidaria serrula**, *Benson.*

Pupa serrula, Benson, A. M. N. H. ser. 3, xii, 1863, p. 427; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 319.
Pupa (*Vertigo* (*Alaea*)) *serrula*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 358.

Original description:—"P. testa rimata, ovato-conica, oblonga, oblique subcostulato-striata, albida; spira elongato-conica, apice obtuso; sutura profunda crenulata; anfractibus 5, superioribus valde convexis, ultimo antice ascendente; apertura quadrato-ovata, sexdentata, lamina parietali 1 subduplici, columellari 1 superiore denteque minuto inferiore, dente minuto basali; palatali 1 superiore laminaque inferiore profunda munita; peristomate undique expanso, marginibus tenuibus callo lato superne junctis.

"Long. 2, diam. $\frac{2}{3}$ mill." (*Benson.*)

Hab. India: Central India (*Theobald*).

Is stated by Pfeiffer to be similar to *P. mimula*. I have not seen any specimens; the type, like so many other of Benson's shells, having apparently gone astray. It appears to be a rare species.

Genus **BOYSIDIA**, *Ancey.*

Boysidia, Ancey, Le Naturaliste, No. 47, 1881, p. 373 (as section of *Pupa*).
Gredleriella, Möllendorff, Jahrb. Deuts. Malak. Ges. xi, 1884, p. 179 (for *Pupa hunana*).
Bensonella, Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, 1900, p. 591, footnote.

Type, *Pupa dorsata*, Ancey.

Range. India, Farther India, China, Malaysia.

Shell minute, rimate, conoid, with closely coiled, convex whorls, last whorl ascending in front, dilated towards the aperture, tumid below. Aperture armed with several plicæ or lamellæ. Peristome continuous.

Anatomy unknown.

Ancey, in describing *Pupa dorsata*, from China, states that it pertains to the Asiatic group of *P. plicidens*. He proceeds:—"Benson found a certain resemblance or rather established a connection between these forms and the species of a certain group (*Boysia*), equally peculiar to Asia. These Pupas appear to me to constitute a distinct section, which I propose to name *Boysidia*, on account of the resemblance to the genus referred to."

Prof. Pilsbry in proposing the subgenus *Bensonella* in 1900, with *Pupa plicidens* as type, seems to have ignored the fact that Ancey had already included the species in the section *Boysidia*, established for the reception of *Pupa dorsata*, for he makes no allusion to it, although on the next page he reduces *Boysidia* to a subgenus under *Hypselostoma*, a procedure in which I am unable to follow him, for I believe a greater affinity exists between *plicidens* and *hunana* than between the latter and the genus *Hypselostoma*.

Besides the two species referred to, some other Chinese forms belong here, *i.e. Pupa hunana*, Gredler*, *P. strophostoma*, Möllendorff†, *P. angulina*, Gredler‡.

264. Boysidia plicidens, *Benson.*

Pupa plicidens, Benson, A. M. N. H. ser. 2, iv, 1849, p. 126; Küster, Conch.-Cab., *Pupa*, 1852, p. 136, pl. 17, figs. 23, 24; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 553; Hanley & Theobald, Conch. Ind. 1874, pl. 100, fig. 8; Sowerby, Conch. Icon. xx, 1876, *Pupa*, pl. 16, fig. 151.

Vertigo (*Odontocyclas*) *plicidens*, Adams, Gen. Rec. Moll. ii, 1855, p. 173.

Pupa (*Scopelophila*) *plicidens*, von Martens, Die Heliceen, ed. 2, 1860, p. 296.

Pupa (*Scarabella*) *plicidens*, Pfeiffer, Malak. Blätt. ii, 1876, p. 175.

Pupa (*Odontocyclas*) *plicidens*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 350.

Pupa (*Boysidia*) *plicidens*, Ancey, Le Naturaliste, No. 47, 1881, p. 373.

Bifidaria (*Bensonella*) *plicidens*, Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, 1900, p. 591.

Juv.? = *Hydrocena milium* (Benson), Godwin-Austen, P. Z. S. 1872, p. 515, pl. 30, fig. 3.

Original description:—"T. umbilicata, ovato-conica, subtrochiformi, glabrinscula, obscure striata, cornea; anfractibus quinque convexis, ultimo ventricoso, antice ascendente, ad basin tumido; sutura impressa; apice obtuso; apertura irregulari subtriangulari, 9-plicata; peristomate continuo, sinuato, expanso, marginibus callo appresso expanso junctis: dextro medio extus impresso, intus tuberculato-incrassato; plicis parietalibus 3, quarum 2 superioribus elongatis, columellari dentiformi, unica, palatalibus 5, quarum 2 sub-basalibus, minutis; margine basali extus callo prædito; umbilico angusto.

"Long. 2, lat. 1½ mill." (*Benson.*)

Hab. India: Landour (*Hutton*); Mussoorie; Cherra Poonjee, Assam (*Godwin-Austen*).

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* Gredler, Jahrb. Deuts. Malak. Ges. viii, 1881, p. 23, pl. 1, fig. 5; Heude, Moll. Terr. Vall. Fl. Bleu, 1882, p. 76, pl. 18, fig. 25.

† Jahrb. Deuts. Malak. Ges. xii, 1885, p. 395, pl. 11, fig. 23.

‡ Conchyl. Fauna von China, viii, 1885, p. 7.

"This shell is very peculiarly formed, and seems to indicate the transition from *Pupa* to *Anostoma*. The animal has four tentacula, the superior pair bearing the percipient points or eyes, the inferior very short. The foot is hyaline, the tentacula and neck fuscous. The shell is carried horizontally." (*Benson.*)

The only known Indian form of this genus. It somewhat resembles *Hypselostoma bensoni*, but is more conoid, the umbilicus is a mere puncture, too small even to admit a bristle, and the last whorl is much less dilated towards the aperture. Of the three parietal lamellæ, the two principal ones are deeply entering; the upper or outer runs as far as the margin of the peristome; the second is compressed, much more elevated anteriorly, being triangular, and terminates a little further from the peristome; the third (inner) or infra-parietal is very small and deep-seated. The palatal denticles are rather deep-seated, elongated, compressed, and usually five in number, the three upper largest, the other two basal, minute, especially the fifth; another compressed elongated denticle occurs on the columella. All these are distinctly visible through the shell-wall from the outside. In addition there is a small conical denticle on the edge of the outer margin of the peristome, with a corresponding scrobiculation on the outer side. This latter feature is not mentioned by Benson.

The species appears fairly common, for the British Mnseum possesses forty specimens from Mussoorie presented by Hutton, fifteen specimens from Landour, and in the Theobald collection there are seven shells from Cherra Poonjee. The McAndrew collection also contains a considerable number.

265. Boysidia salwiniana, *Theobald.*

Pupa salwiniana, Theobald, J. A. S. B. xxxix, 1871, p. 400; Hanley & Theobald, Conch. Ind. 1874, pl. 100, fig. 9; Sowerby, Conch. Icon. xx, 1876, *Pupa*, pl. 16, fig. 150; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 403.

Pupa (*Scopelophila*) *salwiniana*, Nevill, J. A. S. B. xlvi, 1877, p. 23; ibid., Hand List, i, 1878, p. 192; ibid., in Anderson, Zool. Res. Two Exp. W. Yunnan, i, 1879, p. 882.

Pupa (*Pupilla*) *salwiniana*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 355.

Pupa salwineana, Godwin-Austen, P. Z. S. 1888, p. 244.

Original description :—"Testa pyramidata, rimata, fusco-cornea, epidermide lævi induta; anfractibus 6, convexiusculis, sutura impressa junctis, ultimo ad aperturam breviter ascendente; apertura rotunde oblonga, parum dilatata et tertiam longitudinis superante, dentibus quinque, albidis instructa: dente primo parietali magno, lamellari, mediano, alteroque parietali minimo juxta suturam posito, tertio parvo umbilicum juxta, quarto quintoque in labro submediano et ad basin sitis, modicis, æquidistantibus; labro simplici, non reflexo.

"Long. ·16 [=4 mm.], lat. ·09 [=2·25 mm.], aperturæ alt. ·06 unc. [=1·25 mm.]." (*Theobald.*)

Hab. Burma: Shan States (*Fedden*); Bhamo (*Anderson*). Pingoung, Shan Hills (*Godwin-Austen*).

Theobald states that the species resembles *P. bathyodon*, Benson, but is more acuminately and regularly pyramidal. I have not seen *bathyodon*, but to judge by the figures in Conch. Ind. the comparison is not a happy one. *B. salwiniana* appears to me to assimilate rather with *plicidens*. The spire, however, is more attenuated, and the shell is about twice as large. There is also an inflection of the right (outer) margin of the peristome, which is continued as a horizontal superficial groove on the outer wall, corresponding with an elongated horizontal fold on the inside of the right margin, a feature which still further tends to connect this species with *plicidens*, and induces me to place it in the genus *Boysidia*.

Two specimens in the Beddome collection (British Museum), labelled Burma, are rather larger than the type, measuring 5·2 × 3·5 mm. including the peristome.

Godwin-Austen, who records it from Pingoung, Shan Hills, at an altitude of 2500 feet, mentions that the only perfect specimen found was bleached, but a smaller imperfect one was covered with a brown epidermis. He calls it a very beautiful little shell, which undoubtedly it is.

Genus **BOYSIA**, *Pfeiffer.*

Boysia, Pfeiffer, Zeit. Malak. vi, 1849, p. 105; ibid., Mon. Helic. Viv. iii, 1853, p. 528; ibid., Conch.-Cab. *Helix*, ii, 1853, p. 6; Adams, Gen. Rec. Moll. ii, 1855, p. 167; Nevill, J. A. S. B. l, 1881, p. 128; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 343.

Hypostoma, Albers, Die Heliceen, 1850, p. 130 (non *Hypostoma*, Rudolphi, 1809, Vermes, non *Hypostoma*, auct. (*Hypostomus*, Lacepède, 1803), non *Hypostoma*, Gray, 1841, Echinod.).

Hypotrema, von Martens, Die Heliceen, ed. 2, 1860, p. 304 (nom. mut. as section of *Pupa*).

Type, *B. boysi*, Pfeiffer.

Range. India.

Shell globose-conoid, thin, rimate, last whorl arcuately ascending; aperture oblique, directed upwards, subrotundate, continuous, edentulate.

Anatomy unknown.

The only known species of this genus has had a somewhat checkered career. Described originally by Pfeiffer in 1846 as *Tomogeres boysii* (evidently a misprint for *Tomigerus*), it was in 1847 transferred by the same author to *Anostoma*, both the generic and specific designation being apparently suggested by Benson, who published the name in 1848. Pfeiffer having arrived at the conclusion in 1849 that the species could not be retained in *Anostoma*, created the genus *Boysia* for its reception,

placing it near *Pupa*. At the same time he altered the specific name to *bensoni*, to do which he had no right and for which, moreover, there was no need. Curiously enough, with one exception, every subsequent author who has referred to the species has acquiesced in this arbitrary procedure. In 1850, Albers, unaware apparently that Pfeiffer had already proposed a new genus, introduced *Hypostoma*, placing it between *Anostoma* and *Tomigerus*. The name having already been employed in three different classes in zoology, von Martens, in 1860, altered it to *Hypotrema*, at the same time reducing it to a section of *Pupa*.

In 1867 Stoliczka described a fossil shell, from a cretaceous fresh-water deposit in the North-Eastern Alps, under the name of *Boysia Reussii* *. Nevill in referring to this fossil † states that it is a well characterized form and considers, judging from the figure, that it is possibly correctly referred to *Boysia*.

With all due deference to the weighty opinion of so eminent a naturalist as Stoliczka or that of Nevill, I do not think the association of two such different forms in one genus a very happy one. The recent Indian shell has the aperture on the same level as the penultimate whorl, forming not a rectangle but a very acute angle, and on the last whorl the mouth is vertical, whereas the European cretaceous shell has the mouth inclined at a very acute angle. Sandberger certainly had a much truer perception of its affinity, I believe, when he referred the fossil to the genus *Strophostoma* ‡.

Quite recently Professor Cockerell has also referred two Tertiary species from Wyoming, U.S.A., to the genus *Boysia* §. One of these, *B. phenacodorum*, to judge from the figure, bears a striking resemblance to the Indian recent species. I am inclined to think, however, that this is simply a case of convergence. For another closely allied form he creates a new genus, *Protoboysia*.

266. **Boysia boysi**, *Pfeiffer*.

Tomogeres boysii (*Anostoma*) (Benson), Pfeiffer, Symb. Hist. Helic. iii, 1846, p. 82.

Anostoma boysii (Benson), Pfeiffer, Mon. Helic. Viv. i, 1847, p. 2; Benson, A. M. N. H. ser. 2, ii, 1848, p. 164.

Boysia bensoni, Pfeiffer, Zeit. Malak. vi, 1849, p. 105; ibid., Conch.-Cab., *Helix*, ii, 1853, p. 6, pl. 101, figs. 25–28; Adams, Gen. Rec. Moll. ii, 1855, p. 167, pl. 76, fig. 2; Pfeiffer, Malak. Blätt. ii, 1856, p. 172; Hanley & Theobald, Conch. Ind. 1870, pl. 8, fig. 1; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 343; Tryon, Struct. Syst. Conch. iii, 1884, p. 55, pl. 100, fig. 98.

Hypostoma boysii, Albers, Die Heliceen, 1850, p. 130.

Pupa (*Hypotrema*) *boysii*, von Martens, Die Heliceen, ed. 2, 1860, p. 305.

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* Sitz.-Ber. K. Akad. Wiss. Wien, xxxviii, 1859, p. 493, pl. 1, fig. 17.
† J. A. S. B. l, 1881, p. 128.
‡ Land- und Sussw. Conch. Vorwelt, 1871, p. 80, pl. 3, fig. 12.
§ Bull. Amer. Mus. Nat. Hist. New York, xxxiii, 1914, p. 324.

Pupa (Boysia) bensoni, Nevill, Hand List, i, 1878, p. 194.
Boysia boysii, Kobelt, Illustr. Conchyl. Buch, ii, 1878, p. 278, pl. 85, fig. 10.

Original description:—"T. arcuato-rimata, compresso-conica, tenuis, lævigata, diaphana, pallide cornea; spira oblique conoidea, obtusiuscula; anfr. 5 convexi, ultimus arcuatim ad marginem superiorum antepenultimi ascendens; apertura subtriangulari-rotundata, edentula; perist. subsimplex, expansiusculum, marginibus lamina breviter soluta junctis.

"Diam. maj. 3½, alt. 3 mill." (*Pfeiffer.*)

Hab. India: Chittore, Rajputana, and Azmere (*Boys*); Nerbudda Valley (*Nevill, Stoliczka*).

The Cuming collection contains two specimens from Bengal, while there are some shells from Mandata, on the Nerbudda, in the Theobald collection. The latter are smaller than the type, their dimensions being:—major diam. 2·5, minor 2, alt. 2·5 mm.

Genus HYPSELOSTOMA, *Benson.*

Tanystoma, Benson, A. M. N. H. ser. 2, xvii, 1856, p. 130.
Hypselostoma, Benson, tom. cit. p. 342 (nom. mut.); Fischer, Man. Conchyl. 1885, p. 478; Pilsbry, Proc. Acad. Nat. Sci. Philadelphia, 1900, p. 592.

TYPE, *Tanystoma tubiferum*, Benson.

Range. Burma, Farther India, China, Malaysia, Philippine Islands, and Loo Choo Archipelago.

Shell deeply umbilicate, depressed, conoid, whorls few, the last solute, twisted; aperture oblique or horizontal on a level with the apex, denticulate.

Anatomy unknown.

A peculiar genus of Mollusca, the type of which is, as Prof. Pilsbry aptly observes, one of the most extreme modifications and not a fair criterion. He considered the genus rather nearer to *Nesopupa* and even *Torquilla* than to *Bifidaria*.

Burma has produced three species, the other two, unlike the type, having the aperture but slightly oblique, almost vertical, instead of horizontal, in a plane with the apex.

267. Hypselostoma tubiferum, *Benson.*

Tanystoma tubiferum, Benson, A. M. N. H. ser. 2, xvii, 1856, p. 130.
Hypselostoma tuberiferum, Adams, Gen. Moll. ii, 1858, p. 640, pl. 138, fig. 4; Pfeiffer, Novit. Conch. ser. 1, i, 1860, p. 130, pl. 36, figs. 1–4; Blanford, J. A. S. B. xxxii, 1863, p. 326; Stoliczka, J. A. S. B. xl, 1871, p. 173, pl. 7, fig. 1 (animal); Hanley & Theobald, Conch. Ind. 1870, pl. 8, fig. 3; Kobelt, Illustr. Conchyl. Buch, ii, 1878, p. 278, pl. 85, fig. 44; Tryon, Struct. Syst. Conch. iii, 1884, p. 56, pl. 100, fig. 99; Cooke, Cambr. Nat. Hist. iii, 1895, p. 302, fig. 202 A.
Pupa (Hypselostoma) tubifera, Nevill, Hand List, i, 1878, p. 193.

Original description:—"Testa depresso-conoidea, radiato-striata,

conica, sutura excavata, spira breviter conoidea, apice obtusiusculo; anfractibus 3, convexis, ultimo tubam protractam, sursum tortam, altiorem quam apice, efformante, ad periphæriam valide et obtuse carinato, superne baltea tumida, a periphæria sulco profundo separata, munito, subtus convexo, margine umbilici aperti perspectivi angulato, angulo usque ad aperturam extendente; apertura horizontali sursum spectante, 6–7 dentata, dentibus lamelliformibus duabus parietalibus, supera validiori duplicata, inferiori minore profunda, 1 columellari mediocri, 4 palatalibus, quarum superiori duplicata tertiaque majoribus; peristomate libero, valde expanso, reflexiusculo.

"Diam. maj. 4, min. 3, axis 2 mill." (*Benson.*)

Hab. Burma: Thyet Mio (*Blanford, Theobald, Oldham*); Mya Leit Doung, Tsagyen Hills, and Pegu as far south as Henzada (*Blanford*).

The animal of *H. tubiferum* has been observed both by Blanford and Stoliczka. The latter gave a figure and described the specimens seen as "pale grey; they had the eye pedicles rather more elongated than usually in species of *Pupa,* and more resembling those of *Helix*; the tentacles at the base of the rostrum were very minute, both blackish. The rostrum itself is thick and very minutely notched at the front edge. The foot is short, ovately elongated, roundly truncate posteriorly. The animal, when moving, carries its shell in a reverse position. On the whole it greatly resembles that of *Anostoma,* as figured by Fischer in Journ. de Conch. for 1869, vol. ix, pl. xi, figs. 1, 2."

Hypselostoma tubiferum is the largest and most depressed of the Burmese forms of the genus. It is, moreover, readily separated from its congeners by the aperture being horizontal and on a level with the spire. The parietal entering lamellæ are sometimes bidentate. The species appears to be fairly common and occurs in many collections. Some specimens in the Cuming and Theobald collections are somewhat larger than the type, measuring: major diam. 4·25, minor 3·10, alt. 3·5 mm.

268. **Hypselostoma bensonianum,** *Blanford.*

Hypselostoma bensonianum, Blanford, J. A. S. B. xxxii, 1863, p. 326; Pfeiffer, Mon. Helic. Viv. v, 1868, p. 437; Hanley & Theobald, Conch. Ind. 1870, pl. 8, fig. 2; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 344.

Pupa (*Hypselostoma*) *bensoni,* Nevill, Hand List, i, 1878, p. 193.

Original description:—"Shell moderately umbilicated, turbinate, not distinctly striated, thin, horny. Spire conical, apex papillar and with the axis oblique, suture deep. Whorls 4, the upper ones flattened, the last bulging below the suture, and again at the periphery (where it bears a prominent rounded keel), rounded beneath, and compressed towards the umbilicus. It rises somewhat towards the mouth, which is round, nearly vertical, slightly turned upwards, free from the other whorls, and furnished

inside with 5 lamellar teeth, 4 of which are equidistant and opposite to each other, at the upper and lower corners of the mouth, so as to form a partial St. Andrew's cross, while the fifth, which is smaller, is close to and above that at the upper corner of the parietal margin. Peristome free, simple, broadly expanded and trumpet-shaped." (*Blanford.*)

Major diam. 3, minor 2·2, alt. 2 mm. Diam. of peristome 1 mm.

Hab. Burma: Mya Leit Doung, Ava (*Blanford, Oldham*).

"The differences between this shell and *Hypselostoma tubiferum*, Benson, hitherto the only known species of the genus, are numerous. That shell has the spire scarcely exserted, while the last whorl ascends so much that the mouth, which is horizontal, is on a level with the apex. In the present species the spire is conical, the mouth nearly vertical, and the last whorl only ascends very slightly. In *H. tubiferum* also, there are more teeth in the mouth, they are situated further back from the aperture, and are somewhat differently disposed, the upper two lamellæ being produced in front of the others, and forming an imperfect tube. There are also minor differences in striation, umbilicus, etc. Nevertheless the general appearance of the two species is strikingly similar, and the peculiar shape of their whorls and mouth recalls those of the Brazilian genus *Anostoma*, Lam." (*Blanford.*)

Some specimens in the Theobald collection measure: major diam. 3, min. 2, alt. 2 mm. (including the peristome).

269. **Hypselostoma dayanum,** *Stoliczka.*

Hypselostoma dayanum, Stoliczka, J. A. S. B. xl, 1871, p. 172, pl. 7, fig. 2; Hanley & Theobald, Conch. Ind. 1876, pl. 147, fig. 10; Pfeiffer, Mon. Helic. Viv. vii, 1876, p. 488; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 344.
Pupa (*Hypselostoma*) *dayana*, Nevill, Hand List, i, 1878, p. 193.

Original description:—"Hypselostoma testa minuta, conoidea, solidula, pallide brunnea, apice obtusiuscula, late profundeque perspective umbilicata; anfractibus 4, convexis, suturis profundis sejunctis, primo lævigato, submammillato, ceteris striis incrementi subobsoletis notatis, ultimo maximo, fere plane voluto, supra ad peripheriam subangulato, deinde sensim angustiore et ad marginem umbilici rursus obtuse angulato; apertura fere verticali, vix descendente, conspicuiter dilatata, subcirculari; marginibus junctis, intus crassiusculis et plicose dentatis; labio adnato modice expansiusculo, bidentato, dente superiore majore; labro six-dentato: dentibus duobus in regione columellari sitis subdistantibus, alteris duobus, in margine externo, similariter inter se remotis, sed duobus in marg. basali sitis approximatis, parvis.

"Diam. maj. 1·1, d. min. 0·8; altitudo 1 mm."

Hab. Burma: Damotha near Moulmain. (*Stoliczka.*)

"It is the third known species of the genus. In general form

it resembles Blanford's *H. Bensonianum* from near Ava, but differs in the shape of the last whorl, and in the dentition of the aperture. The latter is in both species almost vertical, not turned entirely upwards, as in the type of the genus, *H. tubiferum*. As regards form, the present species indicates still more distinctly the affinities of *Hypselostoma* to *Pupa*, than does *H. Bensonianum*." (*Stoliczka.*)

In addition to the fore-mentioned differentiating characters *H. dayanum* may at once be distinguished by its smaller size, being the smallest member of the group. It appears to be a rare species and I have not seen any specimens.

Family CLAUSILIIDÆ.

Genus **CLAUSILIA**, *Draparnaud.*

Clausilia, Draparnaud, Hist. Nat. Moll. Terr. Fluv. France, 1805, pp. 24, 29; Stoliczka, J. A. S. B. xl, 1871, p. 173 (anatomy); Boettger, Palæontogr. 3rd Suppl. 1877; ibid., 17 & 18 Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 18; Wiegmann, Jahrb. Deuts. Malak. Ges. v, 1878, p. 157 (anatomy).

TYPE, (first species) *Turbo bidens*, Linn.

Range. India, Ceylon and Nicobars, Farther India, China, Japan, Malay Archipelago; Asia Minor; Northern Africa, Madeira; Europe; South America and Porto Rico.

Shell sinistral in the great majority of species (invariably so in the Indian forms), cylindrical or fusiform, more or less solid, usually striated or ribbed transversely, generally more strongly so behind the aperture; spire usually turreted, with acute or obtuse apex; aperture small, usually pear-shaped, sometimes subquadrate-ovate, sometimes with a sinus at the upper angle, provided with two spiral entering folds usually on the parietal lip, the lower sometimes on the outer lip, both continued internally as far as the seat of attachment of the pedicle of the clausilium; the upper follows the spiral convolution of the columella and becomes the columellar fold (inferior lamella of Pfeiffer); a second fold further back, known as the subcolumellar (columellar of Rossmässler) fold, its termination sometimes visible from the aperture; these two folds form a long flexuous groove, slightly dilated towards the aperture, but further down becoming again contracted. In addition there is a curved flexuous, tongue-shaped, elastic plate, known as the clausilium, which higher up becomes contracted into a narrow twisted pedicle, its distal extremity attached to the inner shell-wall, between the distal extremities of the columellar and subcolumellar folds, the groove between these, lower down, receiving the clausilium as it is pushed to one side by the animal's extrusion. In addition to these processes there are a varying

number of palatal plicæ behind the aperture, and usually showing through the shell-wall. In some species two of these plicæ have their posterior extremities curved and approximating, ultimately uniting and forming the so-called lunella. Peristome continuous. Umbilicus usually very slight, and consisting of a narrow, oblique slit behind the columellar margin.

"The animal of *Cl. philippiana* is black with a greenish tinge on the posterior part of the body, which is covered with rather coarse warts; the pedicles are moderately elongated, pinkish, slightly swollen at the tips which bear the small eyes centrally; tentacles very short, but distinct; foot moderately elongated, strong, posteriorly obtusely pointed.

"The mantle has a free entire edge, and is internally somewhat thickened, especially on either side of the pulmonary orifice. At the place of the labial fold the edge is simply grooved. Corresponding to the columellar rib the groove is much stronger and deeper, extending with free raised edges to the mantle-margin. The lower (or anterior) of these lamellar edges is semicircularly enlarged, and towards the end folded over; it secretes the columellar fold, with its internal laminar projection for the support of the clausilium. The upper (or posterior) edge is smaller and evidently secretes the clausilium; it becomes folded over the former when the animal protrudes out of its shell.

"As regards the internal structure there is nothing very distinct from the anatomy of the HELICIDÆ.

"The pulmonary cavity is narrow and long, the mantle forming it being rather thick and of a deep pinkish black colour. The kidney is of a large sub-triangular form, and one portion of it almost entirely envelopes the heart. The mouth is small and the salivary glands lie immediately behind it, covering the anterior part of the alimentary canal, while in most HELICIDÆ they are on long peduncles and situated at the lower anterior base of the stomach. The oral parts and the salivary glands are pinkish grey. The intestines make only a slight bend, and the rectum is accompanied by a very narrow albuminous gland, along which also the duct leading from the kidney appears to lie.

"The retractor muscle of the body is divided in two very broad and strong parts; they are attached to the anterior end of the foot, below the mouth, and divide posteriorly again into several thin branches. The retractor muscles, supporting the buccal parts, are shorter and also bipartite. The nervous ganglion ring lies immediately behind the mouth and is covered up by the anterior part of the salivary glands; it is very thin and gives only a few very thin branches to the lips, the pedicles and to the generative organs. The small extent of the nervous system is very striking, as compared with the same organs in the HELICIDÆ and ZONITIDÆ.

"The generative organs fill the anterior part of the body nearly entirely. The uterus is comparatively thin, of grey colour; the albuminous gland, attached to it, very large, nearly as long

as the uterus, and more than double its thickness. The receptaculum seminis is an oval pedunculated gland, lying either along the uterus, or obliquely across the body, a short distance below the hermaphrodite opening, enveloped in soft tissue. It is provided with a long appendage, attached along the uterus, and equal in length to it. This appendage contains an orange coloured, tough flagellum, filled with a whitish substance, and possibly represents the arrow (or armatorial) sac.

"I have not observed the presence of spermatozoa in the so-called 'receptaculum seminis'; it was filled with flattened transparent bodies and some colouring matter. The vas deferens branches off about half way from the uterus, makes a few twists, attaches itself to the tissue just below the hermaphrodite opening, and then shortly after becomes thickened, being at this place fixed with a small and thin retractile muscle. The penis makes three distinct twists, or almost coils; it is very long and the terminal half is more thickened than the other; it ends with a thin flagellum.

"The jaw is semilunar, narrow, thin, concentrically very finely and radiately distantly and indistinctly, striated, the anterior concave edge is nearly perfectly entire.

"The radula is long, moderately narrow, consisting of about 80 transverse, slightly angular series of teeth, there being 53 teeth in each series. The centre tooth is smaller than the adjoining, with a simple, inflected and pointed tip; it is contracted towards the base. The 14 inner laterals are longer and stronger than the 12 outer laterals. They are all tri-cuspid; at first the median cusp is by far the largest, gradually the lateral increase in size, while at the same time the median cusp decreases, until on the outermost lateral teeth, the three cusps are almost equal. On the whole the form of the teeth agrees better with that of the HELICIDÆ than with the ZONITIDÆ. The dental formula is 12+14−1−14+12." (*Stoliczka.*)

The characteristic and peculiar feature of the present genus—the clausilium—has been described by several authors. The first to draw attention to it appears to be Daubenton * who referred to it as an "opercule à ressort." Müller † was the next to give a short description of it under *Helix* [*Clausilia*] *bidens*, but more elaborate accounts were given by J. S. Miller ‡, Dr. Gray §, Caillaud ‖ and Fischer ¶, the latter two elucidating their observations with figures. Finally a lucid description, illustrated by elaborate figures, by E. A. Smith and B. B. Woodward ** will be

* Hist. et Mém. Acad. Sci. Paris, 1743, p. 47.
† Verm. Terr. Fluv. ii, 1774, p. 117.
‡ Ann. Philos. N. S., iii, 1822, p. 378.
§ Zool. Journ. i, 1824, p. 212.
‖ Journ. Conchyl. iv, 1853, p. 420, pl. 13, figs. 1–4.
¶ Man. Conchyl. 1883, pp. 484, 485, figs. 251–255.
** Ann. Mag. Nat. Hist. ser. 6, v, 1890, p. 209.

found very useful. While the animal is retracted within its shell the elastic pedicle causes the clausilium to rest against the subcolumellar fold on the inner side and against the shorter palatal plicæ or the lunella, when present, on the outer side, the anterior angle of its inner margin slightly projecting inwardly over the subcolumellar fold, an arrangement which effectively prevents the clausilium being forced to one side from without, thus securing the animal against intruding enemies. During extrusion of the animal the clausilium is pushed sideways into the groove between the columellar and subcolumellar folds, only its anterior portion being pressed slightly forward at the dilated part of the groove. The clausilium may, therefore, be regarded to act as a sliding door, and while closed during retraction of the animal, the spaces between the palatal plicæ are sufficient to admit air for breathing purposes. This peculiar sliding action of the clausilium I have not seen referred to by any of the authors mentioned, which may, perhaps, be explained by the fact that the species which have served as a basis for investigation are rather small and their examination is consequently somewhat difficult. This difficulty may be overcome by utilizing some of the larger Japanese forms—such as *C. martensi*, Herkl., and *C. valida*, Pfeiffer. By the aid of a watchmaker's eye-glass and a needle mounted in a pen-holder, the action of the clausilium can be observed with ease and accuracy. The various folds do not in every species rise at the same point. In some the lower palatal fold rises some distance below the columellar and the subcolumellar folds, in others again the latter rises half way between the other two. The point where the pedicle of the clausilium is attached to the shell-wall, however, is invariably above the termination of any of the folds, at least in all the species—both Indian and extra-Indian—which I have examined. In all the Indian forms the clausilium has the margins entire, but in some Palæarctic species the margin has a short sinus on the outer side and in others again, the anterior margin is in addition bidenticulate. Five species belonging to the Palæarctic subgenus *Alopia*, i. e. *haueri*, *cyclostoma*, *glauca*, *livida*, and *lactea*, are without clausilium. I must own that at first I entertained considerable doubt as to this, but having by the kind permission of the authorities at the British Museum opened specimens of the species in question, I have satisfied myself that this is actually the case.

The distribution of the genus *Clausilia* within the limits of the Indian Empire is somewhat peculiar. Eleven species are known from India but these are all confined to the north, especially the Himalayan region, while none occurs in the whole of southern India, but a single species is known from Ceylon. Burma has no less than fourteen species, while two are found in the Nicobars and the Mergui Archipelago has one.

A large number of sections or subgenera have been established: one of these—*Oospira*, with five species—is confined to Burma,

and another—*Garnieria*—has two species in Burma, one in China and one in Cambodia. The remainder of the Indian *Clausilias* belong to three sections, *Pseudonenia* having twelve species, *Euphædusa* claiming nine, and *Cylindrophædusa* with two. Boettger established a subsection *Acrophædusa*, for the reception of *C. monticola* and *C. arakana*, but without having seen specimens for investigation. As this subsection appears to me of doubtful value I have included the species in *Euphædusa*.

Subgenus **PHÆDUSA**, *H. & A. Adams*.

Phædusa, Adams, Gen. Rec. Moll. ii, 1855, p. 184 (first species *Clausilia cochinchinensis*, Pfeiffer); von Martens, Die Heliceen, ed. 2, 1860, p. 274 (type *C. corticina* v. d. Busch); Boettger, Palæontographica, 3rd suppl. 1877, p. 54; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 390.

"Shell smooth, more or less solid, yellowish or rufo-corneous; lunule none or, very rarely, obsolete; spiral lamella usually disjoined; last whorl appressed, rounded at the base; peristome continuous, free." (*Adams.*)

Section EUPHÆDUSA, *Boettger*.

Euphaedusa, Boettger, Palæontographica, 3rd suppl. 1877, p. 57; ibid., Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 53 (first species *C. bacillum*); Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 390.

TYPE, *Clausilia bacillum*, Hanley & Theobald.

Range. India, Burma, China, Japan, Malay Archipelago.

Clausilium very wide, frequently subquadrate, somewhat dilated below, strongly curved backwards below, acuminate towards the middle. Upper parietal plica long, below it a smaller one united with the rudimentary, interrupted, or small lunella (rarely absent) which at its lower extremity sends off posteriorly a small branch. The upper parietal fold is marginal and nearly vertical, deeply entering; the lower parietal fold approaching the upper, more or less spirally twisted; the subcolumellar more or less immersed. Aperture subvertical, usually pyriform, with strongly thickened margins. The small shell has convex whorls, a deep suture, is usually thin, shining, and corneous, smooth or finely striated, rarely finely ribbed.

270. **Clausilia bacillum**, *Hanley & Theobald*.

Clausilia ignota, Theobald, J. A. S. B. xxvii, 1858, p. 321 (nom. nud.).

Clausilia bacillum (Benson), Hanley & Theobald, Conch. Ind. 1870, pl. 24, fig. 1 (non Theobald); Sowerby, Conch. Icon. xx,

1875, *Clausilia*, pl. 6, fig. 48; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 503.

Clausilia (? *Medora*) *bacillum*, Blanford, J. A. S. B. xli, 1872, p. 200, pl. 9, fig. 3; Stoliczka, tom. cit. p. 207.

Clausilia (*Phaedusa*) *bacillum* (Theobald), Nevill, Hand List, i, 1878, p. 184; Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 328.

Clausilia (*Phaedusa* (*Euphaedusa*)) *bacillum*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 53; Pfeifer & Clessin, Nomencl. Helic. Viv. 1881, p. 390.

"Testa subrimata, fusiformis, solidula, glabra, vix striatula, nitidula, superficie sæpe in exemplis veteribus erosa, albido-vel cereo-cornea; spira superne regulariter attenuata; apice obtuso, papillari; sutura simplice impressa. Anfr. 9 convexi, ultimus validus striatus, pone aperturam vix compressus; apertura verticalis, piriformi-oblonga, lamella supera validiori, columellari antice vix conspicua, parum torta, intus subfurcata; lunella distincta, plicis palatalibus 2, suturæ parallelibus, supera elongata, altera brevi, a lunella vix disjuncta. Peristoma continuum, solutum, album, breviter expansum et incrassatum, margine parietali vix sinuato.

"Long. 15, anfr. penult. diam. 3·5 mm.; apert. cum peristomate 3·33 longa, 2·33 mm. lata." (*Blanford.*)

Hab. India: Nanclai, Khasi Hills (*Theobald, Godwin-Austen*); Naga Hills (*Chennell*); Asalu, Cachar (*Godwin-Austen*); Burma: Schegoo (*Fea*).

"The species varies considerably both in the form and length of the shell. The specimen figured may be taken as the type, but others longer and slenderer are quite as common, they very closely resemble *Theobaldi* in form, differing from it by their smooth shining surface. One of the most slender specimens measures: total length 15, thickness 3 mm.; it has 10½ whorls and is much attenuated towards the apex.

"The representation in the 'Conch. Indica' must evidently be taken as that of true *bacillum*, of which, the authors of that work say, two specimens were known at that time: one in Benson's and the other in Theobald's collection. These are the two specimens to which Theobald (J. A. S. B. 1858, p. 321) refers under the name of *ignota*, as a provisional name, while the single specimen which he quotes l. c. as '*C. bacillum*, B.' is a somewhat worn *Cl. asaluensis*, and hence Theobald's reference that the species is of the type of *C. insignis*. I have carefully examined with Mr. Theobald his type specimens, and the question as regards the synonymy may be considered as settled; the species must stand as recorded by Blanford." (*Stoliczka.*)

271. Clausilia waageni, *Stoliczka.*

Clausilia waageni, Stoliczka, J. A. S. B. xli, 1872, p. 209, pl. 9, fig. 19; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 520; Theobald, J. A. S. B. xlvii, 1878, p. 147; ibid., op. cit. l, 1881, p. 48.
Clausilia (Phaedusa) waageni, Nevill, Hand List, i, 1878, p. 185.
Clausilia (Phaedusa (Euphaedusa)) waageni, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 53; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 391.

Original description:—" Cl. testa conoideo-turrita, corneofusca, apice obtusinscula, sub-rimata; anfractibus 11, paulo convexis, sutura simplici junctis, lateraliter apicem versus paululum concava; omninis transversim oblique confertim costulato-striatis, ultimo antecedente vix latiore, prope aperturam costulato, basi paulum contracto, convexiusculo; apertura verticali, postice (vel supra) angulata; peritremate modice incrassato, vix expanso, albescente, antice recedente, interno soluto, antice rectiusculo, biplicato, plica postica (aut superiore) brevi, altera vix conspicua; lunella distincta, plica longa, tenuissima superposita, altera brevi, a terminatione supera lunellæ haud separata.

" Long. tota 18, diam. 4; long. apert. obliq. 4, ejusdem lat. 2·7 mm." (*Stoliczka.*)

Hab. India: Changligalli, near Murree, W. Himalayas, alt. 9000 feet (*Waagen, Stoliczka*); Tandiani, Hazara (*Theobald*).

" This is the most westerly known species of the genus in India. A single, but perfect, specimen was found by Dr. W. Waagen, together with *Cl. cylindrica*, under the bush of an old tree at the above mentioned locality. The nearest allied species is *C. iös*, but the larger size of the shell, comparative shortness of the two last whorls, larger and more straight aperture readily distinguish this new form." (*Stoliczka.*)

The author in referring to *C. ios* as the nearest ally of this species, appears to have overlooked *C. monticola*, described by Blanford in the same paper, a form which has still closer affinity with it. From this it differs in having the upper part of the spire less attenuated and the striæ are a little coarser.

Four specimens, from Tandiani, in the Theobald collection are somewhat larger than the type, their length being 19·5 mm. Having, by kind permission of the authorities at the British Museum, opened one of these shells, I am in a position to report on the internal armature. The upper parietal fold is interrupted and the inner portion becomes more elevated, gradually decreasing again as it ascends. The subcolumellar fold rises about the beginning of the last whorl close to the columella and becomes a rather broad flexuous fold at once, terminating even more abruptly at a distance of about 0·25 mm. behind the peristome, half-way between the termination of the columellar fold and the lunella. The columellar fold rises a little higher up at the commencement of the last whorl and continues as a fine thread for about half a whorl, when it suddenly increases in height and becomes a flexuous

fold, following the winding of the columella and together with the subcolumellar fold forms a groove—somewhat wider towards the base—into which the clausilium slides when pushed to one side by the animal's extrusion. The pedicle of the clausilium rises about the beginning of the penultimate whorl. The upper parietal fold rises nearly one quarter of a whorl lower than the subcolumellar fold and becomes a broad fold at once. The palatal plicæ I find are not quite as described by Stoliczka, there

Fig. 105.—*Clausilia waageni.*

(Showing inside of last whorl with the palatal plicæ.)

being no true lunella, although, looking from the outside, it somewhat resembles one. The upper plica is, as usual, long and runs parallel with the suture; the second plica is short and parallel with the upper; between them occurs a short denticle almost uniting them, and from the anterior termination of the second plica a nearly vertical plica runs down, forming a right angle, with a slight oblique support posteriorly from its free lower extremity and terminating close to the subcolumellar fold near the aperture. Fig. 105 shows the inner side of the last whorl with the palatal plicæ *in situ*.

272. **Clausilia ios**, *Benson.*

Clausilia iös, Benson, A. M. N. H. ser. 2, x, 1852, p. 351; Godwin-Austen, J. A. S. B. xlv, 1876, p. 318, pl. 8, fig. 13.
Clausilia jös, Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 612.
Clausilia ios, Hanley & Theobald, Conch. Ind. 1870, pl. 24, fig. 10.
Clausilia (? *Medora*) *iös*, Blanford, J. A. S. B. xli, 1872, p. 200, pl. 9, fig. 2.
Clausilia jos, Sowerby, Conch. Icon. xx, 1875, *Clausilia*, pl. 8, fig. 75; Nevill, Hand List, i, 1878, p. 184.
Clausilia (*Phaedusa* (*Euphaedusa*)) *joes*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 53; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 391.

Original description:—"Testa vix rimata, fusiformi, oblique costulato-striata, pallide cornea, spira gradatim attenuata, apice obtusiusculo; anfractibus 8–9, vix convexiusculis, ultimo ad basin rotundato, antice fortius remotiusque costulato; apertura pyriformi, lamellis subæqualibus, inferiori furcata; plicis palatalibus duabus, 1ma longissima, a sutura remotiori, 2nda obliqua, brevi, a lunella satis distincta, interdum vix divisa, subcolumellari immersa, peristomate continuo, superne soluto, undique breviter reflexo.

"Long. 13, diam. 3, apert. long. 3, lat. 2 mill." (*Benson.*)

Hab. India : Darjeeling, Sikkim (*Trotter, Stoliczka, Mainwaring, Blanford*); Bhutan (*Blanford*); Dafla Hills, Assam (*Godwin-Austen*).

"*Hab.* Temperate regious of Sikkim and Butan, in the Eastern Himalayas, from about 5000 to 9000 feet. It doubtless also exists in Nipal. It is generally met with at the roots of oaks and other large trees.

"In this species, as was noticed by Mr. Benson, the lunule is sometimes broken up into short oblique plaits above, and consequently the number of palatal plicæ varies. Sometimes there is only the long lamellar plait above the lunule, in other specimens there are, besides the long one, two short plicæ." (*Blanford.*)

Clausilia ios appears to be one of the commonest species, to judge by the number of specimens in collections. There are shells in the British Museum, presented by Blanford in 1860, which have 10 whorls—therefore with one whorl more than Blanford's type—and measure 13·5 × 3 mm. Four specimens in the Cuming collection, also of 10 whorls, attain a length of 14 mm. The Beddome collection is particularly well supplied, as I have counted no less than two dozen: these are from Darjeeling. The species somewhat resembles *C. theobaldi* but it is smaller and the palatal plicæ are nearer the aperture.

273. **Clausilia ceylanica**, *Benson.*

Clausilia ceylanica, Benson, A. M. N. H. ser. 3, xi, 1863, p. 89; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 427; Nevill, Enum. Helic. Ceylon, 1871, p. 3; Hanley & Theobald, Conch. Ind. 1875, pl. 118, fig. 1.

Clausilia (*? Medora*) *ceylanica*, Blanford, J. A. S. B. xli, 1872, p. 201, pl. 9, fig. 4.

Clausilia (*Phaedusa*) *ceylanica*, Nevill, Hand List, i, 1878, p. 184.

Clausilia (*Phaedusa* (*Euphaedusa*)) *ceylanica*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 53; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 391.

Euphædusa ceylanica, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 290.

Original description:—"C. testa vix rimata, fusiformi, oblique confertissime costulata, costulis nonnullis undulatis, fuscescenti-olivacea; spira gradatim attenuata, lateribus convexiusculis, apice obtusiusculo, sutura impressa; anfractibus 8, convexiusculis, ultimo ad basin rotundato; apertura subobliqua, pyriformi, lamellis contiguis, inferiore valde exserta, torta, plicis palatalibus 2, subæqualibus, elongatis, columellari immersa; peristomate continuo, superne soluto, undique subexpanso, reflexiusculo.

"Long. 12, diam. $2\frac{1}{2}$ mill., apert. long. 3, lat. 2 mill." (*Benson.*)

Hab. Ceylon (*H. Nevill*); Fort McDonald (*Layard*).

"Found by Mr. F. Layard at an altitude of 4500 feet in the central mountain mass of Ceylon. The nearest Indian ally in form is the Darjiling *C. ios*, from which it may at once be

distinguished by its sculpture, texture, and the internal plicæ." (*Benson.*)

Blanford, when figuring *Clausilia ceylanica*, states that Benson, in describing the species, overlooked the lunule, which is as well developed as in *C. ios* and *C. bacillum*.

The only known species from Ceylon. In addition to the features mentioned by Benson it may be said to be characterized by the short upper parietal fold. The shell figured by Hanley and Theobald has been presented to the British Museum by Mr. Harvey. It is a trifle more convex than Benson's type, its diameter being 3 mm., whereas Benson, in his original description, mentions 2·5 mm. Like most species of *Clausilia* it varies somewhat in size, for two specimens in the Beddome collection, both of eight whorls, measure 10·5 × 2·75 mm. and 11 × 3 mm. respectively.

274. Clausilia theobaldi, *Blanford.*

Clausilia (? *Medora*) *theobaldi*, Blanford, J. A. S. B. xli, 1872, p. 201, pl. 9, fig. 5.
Clausilia theobaldi, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 521.
Clausilia (*Phaedusa* (*Euphaedusa*)) *theobaldi*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 53; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 391.

Original description :—"Testa rimata, fusiformi turrita, cornea, confertim flexuose costulata, translucens. Spira turrita, sensim attenuata, lateribus superne subrectis, apice acutiusculo, sutura impressa. Anfr. 11 convexi, antepenultimus et penultimus majores, ultimus juxta suturam tumidiusculus infra plicam palatalem superam compressus, subtus rotundatus. Apertura vix obliqua, piriformis, lamellis approximatis, mediocribus, supera acuta, iufera immersa, lunella distincta, plicis palatalibus 2, supera elongata, altera brevi. Peristoma rectum, expansum, solutum, margine palatali haud sinuato.

"Long. 22, diam. 3·5 mm.; apert. 3·5 mm. longa, 2·6 lata." (*Blanford.*)

Hab. Burma: Tonghu (*Theobald, Blanford*); Mai-i, Arakan Coast (*Theobald*).

There are two specimens in the Theobald collection in the British Museum, from hills to the east of Tonghu, the type locality, whose length is less than that indicated in the original description, the dimensions being 17·75 × 3·5 mm. although they possess half a whorl more. The figure given by Blanford in J. A. S. B. is still smaller, measuring only 16 mm. The Beddome collection also contains specimens which reach only 17 mm. in length, the diameter, nevertheless, being 3·5 mm. In the Theobald collection I found three shells labelled "*arakana*, Stoliczka, Mai-i, Arakan Coast," one of which undoubtedly belongs to the present species.

Blanford in his diagnosis only mentions two palatal folds, but I have found a third, which, however, is not visible without opening the shell.

275. **Clausilia burmanica**, sp. n.

Shell rimate, fusiform, fuscous, translucent, very closely invested with fine wavy striæ, traversed by rather irregular, somewhat indistinct spirals. Spire turreted, gradually attenuated, the sides not concave; apex acute; suture impressed. Whorls 11½, convex, last scarcely narrower than penultimate, not compressed below upper palatal plica. Aperture vertical, subquadrate. Parietal folds rather distant, the upper not interrupted, lower rather elongated before entering. Palatal plicæ three, upper long, parallel with the suture; the other two curved, almost meeting posteriorly, rather distant, one being close to the upper plica, the other nearer the aperture. Peristome solute, the margins expanded and reflexed, outer margin descending obliquely.

Long. 21, diam. 4 mm.

Hab. Burma: Tonghu (*Theobald*).

Type in the British Museum.

Fig. 106.—*Clausilia burmanica.*

The specimen upon which this new species is based occurred with two shells of *Clausilia theobaldi*, from which it differs by the much more wavy, closer, and finer striæ, the presence of spirals, and the subquadrate aperture; the two lower palatal plicæ, moreover, instead of being straight and rather close together, as in *theobaldi*, are rather distant and curved, their posterior terminations nearly meeting, as seen in fig. 106 *b*, which shows the inside of the last whorl with the palatal plicæ *in situ*; finally, the last whorl is not compressed below the upper palatal plica, the parietal folds are more distant, the upper is not interrupted and the lower longer before entering, proceeding horizontally.

The Hungerford collection in the British Museum contains two specimens from Bhamo, which I also refer to this new species; they possess twelve whorls.

276. **Clausilia monticola**, *Blanford.*

Clausilia (Phædusa) monticola (Godwin-Austen, MS.), Blanford, J. A. S. B. xli, 1872, p. 204, pl. 9, fig. 13; Nevill, Hand List, i, 1878, p. 183.

Clausilia monticola, Hanley & Theobald, Conch. Ind. 1875, pl. 118, fig. 7; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 467.
Clausilia (*Phaedusa* (*Acrophaedusa*)) *monticola*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 57; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 392.

Original description:—"Testa rimata, exilis, elongata, fusiformi-subulata, solidula, brunnea vel brunnescente-grisea, parum nitida; superficie sæpe erosa; spiræ lateribus antice rectis, apicem papillarem versus concaviusculis; sutura simplice, impressa. Anfr. 13 convexi, primi 4 fere cylindrici, antepenultimus vix quam penultimus major, ultimus ad basin rotundatus, haud compressus. Apertura piriformis, fere verticalis, lamella palatali sinistrorsim deflexa, acuta; columellari subprofunda; lunella nulla, plicis palatalibus fere parallelis 6–7, supera valde elongata. Peristoma continuum, vix solutum, leviter sinuatum, superne repandum, expansiusculum, mediocriter incrassatum, album, margine parietali leviter sinuato.

"Long. 21, diam. anfr. penult. 4 mm.; apert. cum perist. 3·66 longa, 2·66 lata." (*Blanford.*)

Hab. India: Burrail Hills, Assam; North Cachar, alt. 6500 ft. (*Godwin-Austen*).

"This species is well distinguished from its allies by its slender shape and numerous whorls." (*Blanford.*)

The relatively long last whorl and the strongly reflexed and expanded right and basal margins of the peristome are also striking features separating it from the other Indian *Clausilias*. It bears some resemblance to *C. waageni* but the upper portion of the spire is more slender and attenuated. A specimen from the Hanley collection, presented to the British Museum by Mr. Harvey, is presumably the one figured in Conch. Ind., but it has the aperture more pear-shaped than is shown in the figure, the outer margin being more curved. It possesses 14 whorls and measures 22 mm. The figure given by Blanford and Stoliczka in J. A. S. B. is more accurate. A shell with no precise habitat, presented to the British Museum in 1869 by Dr. Horsfield, and labelled *C. cylindrica*, is perhaps a small form of *C. monticola*. It has 12 whorls and measures 16 × 3 mm. Two specimens from North Cachar in the Beddome collection are both composed of 12 whorls, and have a diameter of 3·75 mm., but whereas one measures 21 mm. the other only attains a length of 18·5 mm.

277. Clausilia arakana, *Stoliczka*.

Clausilia arakana (Theobald), Stoliczka, J. A. S. B. xli, 1872, p. 210, pl. 9, fig. 20; Hanley & Theobald, Conch. Ind. 1875, pl. 118, figs. 8, 9; Sowerby, Conch. Icon. xx, 1875, *Clausilia*, pl. 9, fig. 78; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 467.
Clausilia (*Phaedusa*) *arakana*, Nevill, Hand List, i, 1878, p. 183.
Clausilia (*Phaedusa* (*Acrophaedusa*)) *arakana*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 57; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 392.

Original description:—"Cl. testa stramineo-albida, subfusiforme-turrita, apice attenuata, aperturam versus subangustata, non rimata; anfractibus 10–12, paulum convexiusculis, sutura profunda simplici junctis, transversim oblique capillaceo striolatis; apertura rectiuscula, sub-rectangulari, antice subrotundata, marginibus modice dilatatis et incrassatis, labio breviter libero, fere recto, biplicato, plica antica (seu inferiore) valde oblique intrante; plicis palatalibus quinque, fere æquidistantibus et inter se parallelis, supera longissima, cæteris subæqualibus.

"Long. 17–20; lat. 3·8–4; long. apert. 4–4·4, lat. 3–3·2 mm." (*Stoliczka.*)

Hab. Burma: Tonghu and hills S.E. of Akyab, Arakan, and Mai-i, Sandoway district (*Theobald*).

"This is the new Arakan species to which Mr. Blauford alludes at p. 205, when speaking of *Cl. monticola*; it differs from this last by its more fusiform instead of conoidally turreted shape, its thinner texture, larger aperture and somewhat differently arranged palatal folds. I have given illustrations of a shorter form with ten whorls, and of another with twelve whorls; the former is a single specimen from the hills S.E. of Akyab, the other was collected by Mr. Theobald at Mai-i, in the Sandoway district. These two forms represent the extreme variations which were noticed among a large number of specimens." (*Stoliczka.*)

Two shells, from Mai-i, in the Theobald collection, measure 20 × 4 mm., and distinctly show the five palatal plicæ indicated in the diagnosis.

278. **Clausilia lemani**, sp. n.

Shell rimate, fusiform, fuscous corneous, rather solid, opaque, finely striate, closely ribbed behind the aperture on the last whorl, some indistinct, very fine spirals perceptible on the later whorls. Spire turreted, the sides slightly concave; apex slightly obtuse; suture shallow, especially on the later whorls. Whorls 11, the

Fig. 107.—*Clausilia lemani.*

earlier slightly convex, the later ones flattened, the last but little narrower than the penultimate, with a shallow furrow below the lower palatal plica behind the peristome and gibbous around the umbilical slit. Aperture a little oblique, subovate. Parietal folds rather close together, upper not interrupted, lower deflexed towards the columella and descending with the columellar margin. Palatal plicæ three, rather near the aperture, the upper rather

short, parallel with the suture; the second very short, parallel with the upper; the third longer and oblique, entirely visible from the aperture. Peristome slightly thickened, not expanded and but little reflexed, the parietal margin not solute, without sinus at the upper parietal fold, columellar margin curved, obliquely descending, basal margin curved, outer margin a little inflexed.

Long. 16, diam. 4·2 mm.

Hab. Burma: Arakan.

Type in Mr. Leman's collection.

Two specimens in the late Colonel Beddome's collection, now in the possession of Mr. G. C. Leman, were labelled *C. arakanensis*, but upon examination they proved to be quite distinct, and in basing a new species upon them I have much pleasure in associating with the new form the name of Mr. Leman, who upon several occasions has readily given me access to this important collection, so rich especially in Indian and Burmese shells.

The new species, while allied to *C. arakanensis*, may readily be separated by its more convex spire, its more obtuse apex, and the more closely coiled whorls, for although shells of 10 whorls of *C. arakanensis* measure 17 mm. in length, *C. lemani* with 11 whorls only attains 16 mm.; the shell, moreover, is striated, not ribbed. The palatal plicæ are also less in number, and instead of all being parallel, the lowest is nearly vertical, and they are all much nearer the aperture.

Section Pseudonenia, *Boettger*.

Pseudonenia, Boettger, Palæontographica, 3rd suppl. 1877, p. 59; ibid., Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 39 (first species *C. gouldiana*); Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 391.

Type, *Clausilia gouldiana*, Pfeiffer.

Range. India, Burma, China, Japan, Malay Archipelago.

Clausilium attenuated below, the blade somewhat elongated and dilated below. The palatal plicæ varying in number, the upper rather long. Lunula nearly always absent. The upper parietal fold more or less oblique, subcolumellar fold hidden. Aperture large, protracted below, the right upper margin always more or less sinuate towards the upper parietal fold, the peristome strongly expanded and reflexed. The shell has few whorls, usually an acute apex, is corneous and more or less finely striated.

279. Clausilia gouldiana, *Pfeiffer*.

Clausilia gouldiana, Pfeiffer, Malak. Blätt. iii, 1857, p. 259; ibid., Mon. Helic. Viv. iv, 1859, p. 724; ibid., Novit. Conch. ser. 1, i, 1860, p. 123; Hanley & Theobald, Conch. Ind. 1875, pl. 118, figs. 2, 3; Sowerby, Conch. Icon. xx, 1875, *Clausilia*, pl. 16, fig. 148.

Clausilia (Phædusa) gouldiana, Blanford, J. A. S. B. xli, 1872, p. 203, pl. 9, fig. 10; Stoliczka, tom. cit. p. 208.
Clausilia (Phaedusa (Pseudonenia)) gouldiana, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 54; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 148.

Original description:—"T. leviter rimata, fusiformis, solida, conferiissime capillaceo-striata, sericea, rubicunda; spira sursum regulariter attenuata, apice alba, obtusula; anfr. 11–11½, summi convexi, sequentes planiores, ultimus angustatus, basi non compressus; apertura piriformis; lamellae mediocres, infera alte ascendens; lunella nulla; plicae palatales 5–6, supera 1 elongata, 4–5 brevissimae, subparallelae, locum lunellae obtinentis; subcolumellaris inconspicua; perist. continuum, roseum, intus callosum, undique expansum et reflexiusculum, margine supero repando.

"Long. 24½, diam. infra medium 6 mill. Ap. oblique fere 6 mill. longa, 4⅔ lata." (*Pfeiffer.*)

Hab. Burma: Mergui (*Gould*); Moulmain (*Blanford*); Phaloung and Zwagabin (*Theobald, Hungerford*); Tenasserim and Salween Valley (*Beddome*); Gethebian ku and Phabougku (*Theobald*).

Is stated by Pfeiffer to be very closely allied to *Cl. insignis*, Gould, and *philippiana*, but well distinguished.

Stoliczka observes that it is also "one of the most variable species, both in colour and form. Young specimens are either brown or of a beautiful rosy tinge; older shells, after they become solidified, either retain the brown or pink colour, or the lip becomes yellowish-brown or perfectly white; the 3–5 top-whorls are always white. The form differs from fusiform to highly turreted, as may be indicated by the following measurements:—

a. long. 23, lat. 6, long. apert. 5·2, ej. lat. 4·2 mm.
b. ,, 28, ,, 6·3, ,, ,, 6·2, ,, ,, 5 ,,
c. ,, 32, ,, 6·5, ,, ,, 6, ,, ,, 5 ,,

All three specimens are from Moulmain: *a* is almost exactly identical with Pfeiffer's original figure of the species; *b* and *c* are a white and a yellowish lipped variety from Mr. Theobald's collection; *c* has an almost abnormally small aperture as compared with the length of the shell."

A fairly common species. The Cuming collection contains three specimens from Mergui, with pale rufous pink peristome and composed of 10½ and 11 whorls. There are several specimens in the Theobald collection: three from Moulmain, with 10½ whorls, measure 26 × 6·75 mm.; three from Phabougku, with 11½ and 12 whorls, reach a length of 26·5 mm., with a diameter of only 6 mm.; three from Gethebian Ku, with 10½ and 11½ whorls, measure 25 × 6 mm.; while three more from Zwagabin, near Moulmain, have a pink mouth and possess 11 whorls but only attain a length of 22 mm., with a diameter of 5·5 mm. In the Beddome collection I found a specimen from the Salween Valley, pale fuscous in colour with a pink mouth, with 10 whorls,

measuring 22 × 6 mm., and three shells from Tenasserim, also pale fuscous, but more solid in texture, composed of 11 whorls, and measuring 25 × 6, 25 × 6·25, and 24 × 6·25 mm. respectively. Finally, the late Miss Linter's collection, now in the Exeter Museum, yielded two specimens from Phabougku, one of a decided pink colour, with pale pink peristome, each of 11 whorls, and measuring 21·5 × 6 mm.

Clausilia gouldiana is closely allied to *C. insignis*, but may be distinguished by its smaller size, smaller aperture, and lighter colour, but more especially by the more acute apex, a feature by which it may readily be separated from its ally. The 3 or 4 apical whorls also are usually white or pale corneous. The whorls increase very slowly at first, then rather rapidly, the upper part of the spire, consequently, being more concave; the later whorls are rather more convex than in *insignis*. There are from four to six palatal plicæ, the first always long, the others vary in length but are very short comparatively; they may be equal in length or the second and fifth may be longer and the third and fourth very short, or they may gradually decrease in length.

Fig. 108.—*Clausilia gouldiana* (Harvey collection).

The shell figured in Conch. Ind. pl. 118, figs. 2 & 3, which has been presented to the National collection by Mr. Harvey, is rather short and ventricose; it possesses 9½ whorls, and measures 23·5 × 6 mm. This, according to Hanley and Theobald, may be *insignis* of Gould not of Pfeiffer, but I prefer to regard it as a form of *gouldiana*.

I give a figure of this shell and a view of the inside of the last whorl, with the palatal plicæ *in situ*. The upper plica (partly shown) is long, near to and parallel with the suture, the second is stouter, its anterior extremity curving obliquely downwards; the third very short, oblique; the fourth a trifle longer, also oblique; the fifth still longer, nearly vertical, its anterior extremity giving off a slight ridge below near the subcolumellar fold.

Var. magna, nov.

Differs from the type in being less ventricose. A specimen from Moulmain, in the Theobald collection, possesses 13½ whorls, and measures 32 mm. in length with a diameter of 6·5 mm.

There are seven palatal plicæ: the upper loug, uear to aud parallel with the suture, the second one quarter of the length of the upper, the third still shorter but parallel with the first two ; the fourth very short aud oblique ; the fifth considerably longer, oblique, with a short support below near its posterior extremity ; the sixth also oblique and bifurcate posteriorly ; the seventh curved, near the parietal margin of the peristome. This shell is here delineated.

Fig. 109.—*Clausilia gouldiana* var. *magna.*

A second specimen from Phaboo, in the Hungerford collection, measures 12·5 × 6 mm. and possesses $12\frac{1}{2}$ whorls.

280. Clausilia andersoniana, *Möllendorff.*

Clausilia (*Pseudonenia*) *andersoniana*, Möllendorff, J. A. S. B. li, pt. 2, 1882, p. 12, pl. 1, fig. 12.

Original description:—"Testa ventriculoso-fusiformis, solidula, subtilissime striatula, fere lævigata, pallide corneo-fusca, apice obtusiusculo; anfr. 10 convexiusculi, ultimus valde attenuatus, subtus rotundatus, distinctius striatus; apertura parum obliqua, oblique piriformis, peristoma continuum. valde solutum, expansum, reflexiusculum, pallide corneum. Lamella parietalis supera obliqua, sat valida, cum spirali continua, infera crassa ante marginem subabrupte desinens, subcolumellaris immersa. Plica principalis valde elongata, palatales tres subventrales, divergentes, iufima arcuata. Clausilium?

"Alt. 20, lat. 4, apert. long. $4\frac{1}{2}$, lat. $3\frac{1}{4}$ mm." (*Möllendorff.*)

Hab. Mergui Archipelago (*Anderson*).

"Nearly related to *insignis*, Gould. Differs by the smaller size, less ventricose shape, the number of whorls 10 instead of 9, the more elongate and oblique aperture, the freer and more protruding peristome, and its paler colouring and by the closing apparatus. The latter is much more immersed inasmuch as the palatal plaits of *Cl. insignis* are lateral, while those iu the new species are nearly ventral and are, together with the inner end of the very

long principal plait, conspicuous in the penultimate whorl above the aperture. Besides, the number of palatal plaits is only three against five of *Cl. insignis*." (*Möllendorff*.)

A doubtful species not seen by me. Judging from the figure it is more nearly related to *C. gouldiana* than to *insignis*. Specimens of the former from Mergui, in the British Museum (Cuming collection), resemble it, but they are a trifle more ventricose and of a pinkish colour; they are composed of 10½ whorls and measure 23 mm. It should be borne in mind that *C. gouldiana* varies considerably, and I strongly suspect that Möllendorff's species will not stand the test of comparison of actual specimens.

281. **Clausilia gracilior**, *Hanley & Theobald.*

Clausilia insignis, var *gracilior*, Hanley & Theobald, Conch. Ind. 1870, p. 12, pl. 24, fig. 3.

Shell subrimate, fusiform, turreted, rather solid, pale corneous, finely and closely striated, the striæ coarser and more distant behind the aperture, some minute spirals on the later whorls. Spire turreted, apex obtuse, suture impressed. Whorls 9, slightly convex, increasing slowly, last whorl but little narrower than penultimate, flattened near the suture, not compressed below the upper palatal plica. Aperture slightly receding below, pear-shaped; parietal folds rather distant, the upper compressed, elevated at first, becoming depressed after entering, and again more elevated higher up, the lower very stout, obliquely entering.

Fig. 110.—*Clausilia gracilior.*

Palatal plicæ 5, the upper long and parallel with the suture, the second about one-third the length of the upper, parallel at first, its anterior extremity deflexed, the third and fourth very short, oblique, the fifth a little longer, curved, about parallel with the lower suture; the fourth and fifth folds, as well as the subcolumellar fold and the anterior part of the clausilium, are visible from the aperture. Peristome thickened, expanded, and reflexed, solute, the parietal margin with a slight sinus at the upper parietal fold.

Long. 26, diam. 5 mm.

Hab. Burma: Moulmain.

Hanley, when figuring this form, considered it a variety of *Cl. insignis*, and in his explanation of plates indicated Pfeiffer as being responsible for the name *gracilior*, giving the following reference: "*Clausilia insignis*, var. *gracilior*, Pfeiffer (as of Gould), Mon. Helic. vol. 3, p. 589; Novit. Conch. vol. i." Now, Pfeiffer, at the place cited, simply quotes *Clausilia insignis*, Gould, giving a description based upon a specimen in the Cuming collection, but he mentions no variety whatever, and in Novit. Conch. vol. i, pl. 34, figs. 15–17, illustrates typical *insignis*. The present form I consider quite distinct from Gould's and worthy of specific rank. It is more cylindrical in shape, the apical whorls increasing more gradually, the last whorl is not obliquely deflexed, the aperture is more dilated, and the parietal margin of the peristome is more widened and sinuous, while the shell is pale corneous not dark chestnut.

The shell figured by Hanley and Theobald having been presented to the British Museum by Mr. Harvey, I have taken the opportunity of giving a more faithful representation of it, together with an enlarged view of the last whorl showing the palatal plicæ. As, moreover, it was never described, I have also added a full description.

282. **Clausilia insignis**, *Gould*.

> *Clausilia insignis*, Gould, Proc. Boston Soc. Nat. Hist. i, 1844, p. 140; ibid., Boston, Journ. Nat. Hist. iv, 1844, p. 458, pl. 24, fig. 8; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 423; ibid., Zeits. Malak. vi, 1849, p 94; ibid., Mon. Helic. Viv. iii, 1853, p. 589; ibid., Novit. Conch. ser. 1, i. 1860, p. 122, pl. 34, figs. 15–17; ibid., Conch. Cab., *Clausilia*, 1861, p. 300, pl. 34, figs. 10, 11; Hanley & Theobald, Conch. Ind. 1870, pl. 24, fig. 2; Sowerby, Conch. Icon, xx, 1875, *Clausilia*, pl. 6, fig. 53, pl. 7, fig. 53 *b*.
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> *Clausilia* (*Phaedusa*) *insignis*, Pfeiffer, Malak. Blätt. ii, 1856, p. 180; von Martens, Die Heliceen, ed. 2, 1860, p. 275; Blanford, J. A. S. B. xli, 1872, p. 204, pl. 9, fig. 11 (*insignis* of Gould), fig. 12 (*insignis* of Pfeiffer); Stoliczka, tom. cit. p. 208.
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> *Clausilia* (*Phaedusa* (*Pseudonenia*)) *insignis*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 55; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 391.

Original description:—"Testa fusiformi, sinistrorsa, solida, castanea; anfr. 9 convexis, leviter striatis, apertura purpurea, rotundata, lamellis duabus fortibus postice, et quinque tenuibus per testam apparentibus, intus instructa; labro valde reflexo.

"Shell reversed, solid, large, fusiform, ventricose, of a dark chestnut-brown; whorls eight, convex, very delicately and regularly striated, shining, summit mamillated; aperture ovate, broadly rounded in front, with a sinus behind, produced by one of the two large folds which are there found; on breaking away half of a volution, we find five other very delicate laminæ, which may be seen externally, by looking at the umbilical aspect of the

shell; the posterior one is near the suture and extends nearly a whole volution; the others intervene at nearly regular intervals, between it and the umbilicus; throat purplish; lip very broad, flattened, white, tinted with purple.

"Length 1 inch [= 25·25 mm.], breadth $\frac{1}{5}$ of an inch [=5 mm.]." (*Gould.*)

Hab. Burma: Tavoy (*Gould*); Yethebian, near Moulmain (*Stoliczka*); Tenasserim (*Beddome*); Zwagabin (*Theobald*); Kargan, near Moulmain (*Theobald*).

There is a discrepancy with regard to the number of whorls between Gould's latin diagnosis and his English description, the former stating that there are nine, whereas the latter mentions eight. The figure of the shell, although not very clear, rather favours the former.

Stoliczka also refers to a slight discrepancy undoubtedly existing between Gould's original figure and description.

"He states the number of whorls to be 8 or 9, and the apex 'mamillated,' while the figure shews it shortly pointed; then again he gives 'length 1 inch, breadth $\frac{1}{5}$ of an inch.' The original figure (whether enlarged or not, it is not stated) represents a shell of 28 mm. in length and 7 in thickness; the second dimension is, therefore, only one fourth of the total length, instead of one fifth; if the latter were the case, the shell would be an extremely slender one, and comparing it with *gouldiana*, as a shell of the same type, I would prefer to consider Gould's figure as more probably correct than his measurement. Now, allowing for these discrepancies in Gould's original statements, I am inclined to think that Pfeiffer's species is very closely allied to, if not exactly identical with, true *insignis*, but Hanley and Theobald's figures certainly seem to be somewhat different from both the preceding; however, they do not exclude the possibility of representing mere variations of one and the same species. Whether the form of the aperture in Gould's original figure is slightly exaggerated or not, I think the great expansion of the outer lip is decidedly somewhat abnormal, and setting aside this point the remaining differences between the shells figured as *insignis* are not greater than those between the different varieties of *loxostoma* or *gouldiana*."

In order to try and solve the question raised by Stoliczka, as to the discrepancy between Gould's figure and description, I applied to Dr. John M. Clarke, the Director of the Albany State Museum, but to my regret that gentleman informs me under date of July 1, 1914, that no specimens of *Clausilia insignis* can be found in the collection. He states that no such species is listed in the catalogue of the Gould collection prepared by Dr. Gould's daughter, and as this catalogue is an approximately accurate list of the shells delivered when the collection was purchased in 1867, he thinks that they probably never had the type of that species.

Clausilia insignis appears to be fairly common, and I have

seen a considerable series, but I have not observed the same amount of variation as in *Clausilia gouldiana*. It has close affinity with the latter, but may at once be distinguished by the more obtuse apex, the apical whorls being stouter and increasing at once, not gradually as in *gouldiana*, the upper part of the spire is consequently more cylindrical and not concave. The number of whorls ranges between 8½ and 10, and the palatal plicæ vary in number from five to seven, the last being more nearly vertical than in *gouldiana*. The shell is generally of more solid texture, darker, and unicolorous, not whitish or pale corneous, as in its ally, and the peristome dark.

In the Cuming collection I found two shells from Tavoy, labelled by Pfeiffer, which are rufous corneous, with the early whorls paler; one has 9½ whorls, and measures 26 × 6·5 mm., the other has 10 whorls, and attains a length of 27·5 mm., the diameter being the same as in the first. Another tablet in the Cuming collection bears three shells, also from Tavoy, which are pale corneous with the peristome almost white, one of which has 10 whorls and measures 26 × 6 mm., but a second with 9 whorls does not exceed 24·5 mm. in length, although its diameter is also 6 mm. The Beddome collection contains four specimens, very solid and dark chestnut in colour, with a dark fuscous peristome; one of 8½ whorls measures 26 × 7 mm., another of 9 whorls is 27 × 7 mm., while the other two have each 9½ whorls and measure respectively 28 × 7 and 30 × 6·5 mm. Lastly, a variety from Zwagabin in the Theobald collection is pale corneous and less ventricose than the type, possesses 10 whorls and measures 27 × 6 mm.

283. Clausilia fusiformis, *Blanford*.

Clausilia fusiformis, Blanford, J. A. S. B. xxxiv, 1865, p. 80; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 410; Hanley & Theobald, Conch. Ind. 1870, pl. 24, fig. 6; Sowerby, Conch. Icon. xx. 1875, *Clausilia*, pl. 7, fig. 62; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 464.

Clausilia (Phædusa) fusiformis, Blanford, J. A. S. B. xli, 1872, p. 203, pl. 9, fig. 9; Nevill, Hand List, i, 1878, p. 183.

Clausilia (Phaedusa (Pseudonenia)) fusiformis, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 54; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 391.

Original description:—"Shell not rimate, fusiform, horny, thin, white; obliquely, very closely and finely costulately striated throughout. Spire diminishing slowly at first above the middle, then rapidly attenuate towards the acute apex; suture simple, scarcely impressed, deeper towards the apex. Whorls 9, convex above, flattened below, the last very little narrower than the penultimate. Aperture semioval (nearly semicircular); upper parietal plait very fine; internal palatal teeth 7, the uppermost by far the longest. Peristome thin, expanded, not continuous,

the margins being distant, and united by a thin callus; columellar margin straight and very long posteriorly.

"Length 23, diameter 6 mm." (*Blanford.*)

Hab. Burma: Arakan hills, west of Henzada (*Blanford*); Pegu (*Theobald*).

'But a solitary specimen was met with belonging to this form, which is more tumid in the centre than any of its allies, *C. insignis*, Gould, etc. The non-continuity of the peristome may be due to immaturity in the specimen found. The shape of the mouth may also possibly be slightly modified in older examples, but the general form doubtless remains the same, and is alone sufficient to distinguish the species." (*Blanford.*)

The shell figured in Conch. Ind. has been presented, with other shells from the Hanley collection, to the British Museum by Mr. Harvey; it measures 22·5 × 6 mm. Three specimens in the Theobald collection have a length of 23 mm. and a diameter of 6·5 mm., while the Beddome collection contains two specimens measuring 23 × 6·5 mm. All are from the Arakan Hills. The species tends to connect *C. insignis* with such forms as *C. philippiana*, *C. ovata*, and *C. bulbus*, but it is more acuminate and lacks the very obtuse apex of the section *Oospira*, to which these species belong. The upper parietal fold occurs on the outer edge of the parietal margin of the peristome, the lower and the subcolumellar folds only reach the inner edge; there are six palatal plicæ, the upper long, the other five short.

284. Clausilia ferruginea, *Blanford.*

Clausilia (*Phædusa*) *ferruginea*, Blanford, J. A. S. B. xli, 1872, p. 202, pl. 9, fig. 7; Nevill, Hand List, i, 1878, p. 184 (incl. var. *tumida*).

Clausilia ferruginea, Hanley & Theobald, Conch. Ind. 1875, pl. 118, figs. 5, 6; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 466.

Clausilia (*Phaedusa*) (*Pseudonenia*)) *ferruginea*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 54; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 391.

Original description:—"Testa subrimata, elongato-fusiformis, solida, fere glabra, striatula, haud nitida, sordida et interdum pallide ferruginea; spira alta, lateribus sursum subrectis, apice obtuso papillari, sutura impressa, valde crenulata. Anfr. 11 convexi, ultimus capillaceo-striatus, basi rotundatus. Apertura fere verticalis, subtrapezoidalis, marginibus lateralibus fere parallelis, basali rotundato; lamella supera acuta, sinistrorsim inflexa, columellari mediocri, plicis palatalibus circa 5, supera elongata, haud procul ab apertura desinente, suturæ parallela, cæteris magis obliquis curvatisque. Peristoma continuum, album, expansum, parum incrassatum, margine supero repando, leviter sinuato.

"Long. 30, diam. 55 mm.; apert. cum perist. 6·5 longa, 4·66 lata." (*Blanford.*)

Hab. India: Naga Hills, Assam (*Masters*).

"Var. tumida, anfractibus ultimus aperturaque majoribus.

"Long. circa 33, diam. 6·5 mm.; apert. 7 longa, 5 lata." (*Blanford.*)

Hab. India: Gologhat, Assam (*Masters*, *Theobald*); North Cachar (*Godwin-Austen*); Naga Hills (*Chennell*).

"This fine species, the largest hitherto found in Assam or the Himalayas, resembles *C. loxostoma* in its strongly crenulated sutures and in form, but differs in its larger size and more numerous whorls. It was first found by Mr. Masters in 1860, in the hills south of Gologhat, together with *Spiraculum mastersi* and other interesting shells. The more tumid variety has lately been obtained in North Cachar by Major Godwin-Austen." (*Blanford.*)

The Beddome collection contains two specimens, one of which is decollated, but the second is entire, and while, like the type, composed of eleven whorls, it only measures 27 × 5·25 mm. In the Theobald collection is a shell from Gologhat, where the species was first discovered.

285. **Clausilia asaluensis**, *Blanford.*

Clausilia (*Phædusa*) *asaluensis* (Godwin-Austen), Blanford, J. A. S. B. xli, 1872, p. 202, pl. 9, fig. 8.
Clausilia asaluensis, Hanley & Theobald, Conch. Ind. 1876, pl. 159, fig. 5; Peiffer, Mon. Helic. Viv. viii, 1877, p. 466.
Clausilia (*Phaedusa*) *asaluensis*, Nevill, Hand List, i, 1878, p. 184.
Clausilia (*Phaedusa* (*Pseudonenia*)) *asaluensis*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 54; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 391.

Original description:—"Testa non rimata, fusiformi-turrita, alba vel pallide castanea, solidula, striata, ad anfractus duos ultimos capillaceo-striata. Spira sensim attenuata lateribus superne concaviusculis, apice obtusiusculo, sutura impressa, confertim minuteque crenulata. Anfr. 12–13, convexi, antepenultimus maximus, penultimus parum minor, ultimus ad latus compressus, ad basin rotundatus. Apertura subverticalis, piriformis, lamella supera compressa, columellari immersa, lunella nulla, plica palatali supera elongata, suturæ parallela, secunda etiam parallela, mediocri, cæteris obliquis. Peristoma leviter sinuatum, album, incrassatum, continuum, breviter solutum.

"Long. 23·5, diam. 5 mm.; apert. c. perist. 5 longa, 3·66 lata." (*Blanford.*)

Hab. India: Asalu, North Cachar, alt. 7000 feet (*Godwin-Austen*): Khasi Hills (*Theobald*).

"This species is easily distinguished from both *C. loxostoma* and *C. ferruginea* by its more numerous whorls and finely crenulate sutures. In size it is intermediate between the two, some specimens being as much as 26 mm., or rather more than an inch in length." (*Blanford.*)

Clausilia asaluensis is, as might be inferred from Blanford's remarks, although he does not actually say so, intermediate in its characters between *C. loxostoma* and *C. ferruginea*, the sutures

being finely crenulate. The Beddome collection comprises two specimens from North Cachar, which were labelled *monticola*, but which without hesitation I refer to *asaluensis*. One of these is composed of twelve whorls and measures 24 × 4 mm., while the other, which is a trifle more ventricose, has only eleven whorls, and attains a length of but 21 mm., although its diameter reaches 4 mm. The Theobald collection, on the other hand, was found to contain a shell labelled "*bacillum*, Theobald (non Benson)" from the Khasi Hills, which also pertains to the present species. It has twelve whorls and is a trifle more ventricose than the type, for although its length is 22 mm., its diameter attains 4·75 mm.

286. **Clausilia loxostoma**, *Benson.*

Clausilia loxostoma, Benson, J. A. S. B. v, 1836, p. 353; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 404; Hanley & Theobald, Conch. Ind. 1870, pl. 24, fig. 7.
Clausilia bengalensis (v. d. Busch), Pfeiffer, Symb. ii, 1842, p. 60; Küster, Conch.-Cab., *Clausilia*, 1847, p. 24, pl. 2, figs. 11–13.
Clausilia (*Phædusa*) *loxostoma*, Adams, Gen. Rec. Moll. ii, 1855, p. 184; Pfeiffer, Malak. Blätt. ii, 1856, p. 180; Blanford, J. A. S. B. xli, 1872, p. 201, pl. 9, fig. 6; Stoliczka, tom. cit. p. 208; Nevill, Hand List, i, 1878, p. 184.
Clausilia (*Phaedusa* (*Pseudonenia*)) *loxostoma*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 55; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 391.

Original description:—"Testa sinistrorsa, fusiformi, medio-ventricosa, corneo-grisescente; anfractibus, convexis, lævigatis, striis obsoletis; suturis confertissime crenulatis; apertura elongata, obliqua, bi-plicata, supra angustiori, infra dilatata, peristomate reflexo; columella præarcnata.

"Long. 0·85 poll." [21·5 mm.]. (*Benson.*)

Hab. India: Sylhet (*Benson*); Bengal (*Pfeiffer*); Teria Ghat (*Godwin-Austen*, *Theobald*); Naga Hills (*Beddome*); Cherrapoonjee, Assam (*Cantor*; native collector, my collection).

"Out of a collection of 32 European *Clausiliæ* I find none with a similar obliquity of mouth, from which character I have named the species. The outer lip projects beyond the plane of the aperture. The crenulations of the sutures differ altogether from the papillary appearance which is common to several species, such as *papillaris*, *alboguttata*, etc., and they are not elongated as in *C. nitida*." (*Benson.*)

Nevill (Hand List, i, p. 184), mentions but does not describe a var. *striatacostata* collected by Lt.-Col. Godwin-Austen at Teria Ghat, while Stoliczka states that "a white solid variety occurs on the Khasi Hills; in form it tolerably agrees with Blanford's fig. 6 *b*, plate 9; some specimens are, however, still a little thicker, and the transverse costulation on all the whorls is very distinct, while the crenulation along the suture is generally not so coarse as in typical *loxostoma*, though evidently stronger than

in *asaluensis,* which latter also differs by a more slender shape and smaller aperture." This form is referred to by Clessin as var. *solidior*, Stoliczka (Nomencl. p. 391), although Stoliczka did not so name it.

Blanford states that the species varies considerably in form, some specimens being much more fusiform than others. He figures three varieties, of which he considers the first as the typical form. He further states that "the locality usually assigned to this shell, Bengal, conveys a false impression, as neither this nor any other *Clausilia* is found in the plains of India. Teria Ghat, the locality mentioned in the 'Conchologia Indica,' is at the southern base of the Khasi Hills, and the shell is found at many places along the range, from the base up to a height of, I believe, 4000 or 5000 feet. Major Godwin-Austen sent me this species from Habiang on the Khasi plateau. I do not know if *C. loxostoma* occurs also on the northern or Assam flank of the range; I have never seen specimens from any place in that direction, and as the climate is much drier, many of the shells common on the southern watershed are wanting to the north."

When describing *Cl. bengalensis* in 1842, Pfeifer appears to have been unaware of the fact that Benson's species, published in 1836, was identical. In 1848 *, however, he recognized that the two were inseparable, and he relegated *bengalensis* to the synonymy of *loxostoma.*

The crenulations at the suture are rather distant in some specimens and the shell varies, not only in form, as referred to by Blanford, but also in size. A couple of shells from the Naga Hills, having nine whorls, measure 23 × 5 mm. and 25·5 × 5·5 mm. The palatal folds—not mentioned by Benson—are five or six in number, and are distinctly visible from the aperture. Again, three shells from Teria Ghat, in the Theobald collection, composed of 9½ whorls, measure 24·5 × 5·25 mm. On the other hand, some shells from Cherra-poonjee collected by Cantor, and now in the British Museum, only reach a length of 20·5 mm.

287. Clausilia nevilliana, *Möllendorff.*

Clausilia nevilliana, Möllendorff, J. A. S. B. li, part 2, 1882, p. 11, pl. 1, fig. 11; Godwin-Austen, P. Z. S. 1895, p. 443.

Original description :—"Testa elongato fusiformis, subtiliter oblique striatula, fusca, nitidula; anfr. 10 convexiusculi, apertura mediocris, fere verticalis, elongato-piriformis, sinulo recto perlongo, peristoma continuum, solutum, tenue, brevissime expansum, superne profunde sinuatum fere angulatum. Lamella supera obliqua, marginalis, valida cum lamella spirali continua, infera a supera valde remota, spiraliter recedens, brevissime conspicua.

* Mon. Helic. Viv. ii, p. 405.

Plica principalis longa, palatales duæ majores profundæ, ventrales (antice intuenti supra aperturam conspicuæ), lunella nulla. Clausilium ? (non vidi).

"Alt. 20, lat. 4, apert. long. 4, lat. 3 mill." (*Möllendorff.*)

Hab. Nicobar Islands: Kamorta (*Roepstorff*).

"Nearly related to *Cl. javana*, Pfr., and should find its place in Böttger's second section of *Phædusa* (*Pseudonenia*), and in the fifth subgroup of *Cl. javana*."

I have not seen this species, but judging from the figures it appears to have a much more obtuse apex than *Clausilia wuellerstorffi*, also a Nicobar form.

288. **Clausilia shanica**, *Godwin-Austen.*

Clausilia (*Pseudonenia*) *shanica*, Godwin-Austen, P. Z. S. 1888, p. 244.

Original description:—"Testa breviter rimata, fusiformi-clavata, corneo-grisea, solidula; spira concavo-turrita, valde elongata; apex minutus, acutissimus. Anfr. 13½, lentissime accrescentes, convexiusculi, sutura impressa disjuncti, subtiliter striati, ultimus penultimo parum major, subtus leviter attenuatus, cervice rotundatus. Apert. parva, obliqua, late piriformis; perist. continuum, breviter solutum, expansiusculum. Lamellæ modicæ, compressæ, approximatæ; supera marginalis, parum alta, intus humillima, cum spirali ut videtur continua; infera sublimis, subhorizontaliter

Fig. 111.—*Clausilia shanica.* (Type specimen.)

Fig. 112.—*Clausilia shanica.*

in mediam aperturam prosiliens, antice in denticulum desinens, a basi intuenti valde spiraliter torta; subcolumellaris subemersa, oblique intuenti distinctissima. Plica principalis profunda, lateralis, in apertura antice vix conspicua; palatales 2, altera supera, principali approximata et parallela, altera infera cum clausilio perspicuo lunellum lateralem, magis minusve distinctum, fingente."

"Alt. 19½, diam. 4 mm.; alt. apert. 3⅝, lat. apert. 2¾ mm."

Hab. Burma: near Pingoung, Shang Hills, 2500 feet (*Boettger*).

It would appear that the foregoing description is the joint production of the late Professor Oscar Boettger and Mr. John Ponsonby, for Lt.-Col. Godwin-Austen places it in inverted commas, and adds "This description is somewhat amended by

Mr. Ponsonby from one by Dr. Boettger, who considered it to be allied to *C. affinis* of the Naga Hills. On comparison it proves to be very different in every way."

In fig. 112 a specimen in the British Museum from the Shan States is delineated, fig. 112 *b* showing the inside of the last whorl with the palatal plicæ *in situ*, while fig. 111 shows the type, which has the apex broken off.

289. **Clausilia wuellerstorfi**, *Zelebor.*

Clausilia wüllerstorfi, Zelebor, Verh. K.K. Zool.-Bot. Ges. xvii, 1867, p. 806; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 411.
Delima wüllenstorffi, Frauenfeld, Verh. K.K. Zool.-Bot. Ges. xix, 1869, p. 875.
Clausilia (*Phaedusa*) (*Hemiphaedusa*)) *wüllerstorfi*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 59; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 394.
Clausilia (*Phaedusa*) *wüllerstorffi*, Godwin-Austen, P. Z. S. 1895, p. 443.

Original description:—" T. vix rimata, fusiformi-turrita, tenuis, confertim oblique striata, sericina, pellucida, rufo-cornea; spira sensim attenuata, vertice obtusulo; sutura subsimplex; anfr. 10 modice convexi, apicales lævigati, ultimus basi rotundatus, antice dense costulato-striatus; apertura vix obliqua, subtriangulari-piriformis; lamellæ parvulæ, supera marginalis, infere substricte adscendens; lunella nulla; plicæ palatales 3, suprema elongata,

Fig. 113.—*Clausilia wuellerstorfi.*

secunda mediocris, tertia brevis; subcolumellaris inconspicua; perist. continuum, breviter solutum, superne cum lamella supera sinulum rotundatum formans, undique breviter expansum, margine externo fere rectilineari.

"Long. 19, diam. $4\frac{1}{2}$ mm.; aperturæ long. $4\frac{1}{2}$, lat. $3\frac{1}{3}$ mm." (*Zelebor.*)

Hab. Nicobar Islands (*Novara Exped.*); Kamorta, Nancoury (*Godwin-Austen*).

This appears to be a rare shell, the only specimen I have seen being the type, which is in the Vienna Museum, and has been kindly lent by Dr. Sturany. I avail myself of the opportunity to give a figure of it, the species not having been hitherto illustrated. The shell is not quite mature, the peristome having

only just been formed, and the margins are consequently not thickened or dilated, while there is a sinus at the upper parietal fold. The walls of the shell also are thin and translucent.

290. **Clausilia nicobarica**, sp. n.

Shell rimate, fusiform, fuscous, very closely invested with fine slightly wavy striæ, more prominent and wavy on the last whorl, and showing traces here and there of indistinct spirals. Spire turreted, gradually attenuated, the sides almost straight; apex acute; suture superficial. Whorls $10\frac{1}{2}$, slightly convex, the last considerably narrower than the penultimate. Aperture oblique, the basal margin curving forward, pyriform. Parietal folds divergent, the upper interrupted, rather slight and low; the lower more elevated and stouter, deflexed towards the right margin, not reaching the edge of the peristome. Palatal plicæ two, the upper long, parallel with the suture; the lower close to the upper, short, curved. Peristome solute, the margins expanded and

Fig. 114.—*Clausilia nicobarica.*

reflexed, scarcely thickened, left margin descending obliquely outwards, parietal margin without a sinus at the upper fold.

Long. 24·5, diam. 5·2 mm.

Hab. Nicobar Islands. Type in Mr. Leman's collection.

The shell upon which this new species is based occurred in the Beddome collection, and was labelled *wuellerstorfi*, but it is quite distinct. It differs in being darker, more solid and opaque, and is also considerably larger, although it only possesses one half whorl more than *wuellerstorfi*; the aperture is larger and of a different shape, the left margin descending outwardly, besides being obliquely directed forward below, whereas in its ally it is directed backwards. The parietal margin of the peristome has no sinus at the upper fold, the latter, moreover, being interrupted, while the lower fold approaches nearer to the upper, is stouter and more elevated, and obliquely deflexed towards the right margin, but does not reach the edge of the peristome, as is the case in the other species. Lastly, there are only two, instead of three, palatal plicæ.

Subgenus GARNIERIA, *Bourguignat.*

Garnieria, Bourguignat, Ann. Sci. Nat. ser. 6, v, 1877, art. 4, p. 2; Gredler, Drei Neue Clausilia-Arten aus China, Bozen, 1883, p. 1 (as section of *Clausilia*); ibid., Jahrb. Deuts. Malak. Ges. xi, 1884, p. 147; Möllendorff, op. cit. xiii, 1886, p. 207; ibid., Nachr. Deuts. Malak. Ges. xxx, 1898, p. 77 (as subgenus of *Clausilia*).

TYPE, *Clausilia mouhoti*, Pfeiffer.

Range. Burma, Farther India, China.

Last whorl produced, with the umbilical slit above the parietal margin of the peristome, which is solute and more or less horizontal; aperture wider than high, with extended wing-like margins. Clausilium visible from the aperture, more or less doubled on itself lengthwise, forming a deep gutter, the proximal end truncate with a slight indentation (*mouhoti*) or tongue-shaped with a more or less shallow groove, the proximal end pointed and faintly tubercled (*ardouiniana, orientalis, tuba*), sliding over the columellar fold, not between the columellar and subcolumellar folds or only partly so. Upper palatal plica, which is comparatively short, and lunella visible from the aperture.

Bourguignat considered the clausilium of *C. mouhoti* so fundamentally distinct from that in typical *Clausilia*, that he created a separate genus for the reception of this and a few allied forms. While admitting that this structure in *mouhoti* is very remarkable it should be borne in mind that it is only this species which, so far as known at present, exhibits this extreme form of clausilium and that the other species form connecting links with the normal character in this respect, and although the produced last whorl, the transversely dilated, almost subquadrate aperture, the almost horizontal and solute parietal margin and the wing-like expansion of the other thin margins of the peristome, constitute well-marked features, sufficient to warrant the species thus characterized being segregated from their whilom congeners, I do not regard them of generic value. Gredler and Möllendorff were evidently of the same opinion, a fact which induces me all the more readily to reduce *Garnieria* to subgeneric rank.

Only two known species occur in Burma, while Möllendorff in 1898, in addition enumerated ten species: *trachelostropha*, Möllendorff, and *fuchsi*, Gredler, from China; *schomburgi*, Schmacker & Boettger, from Hainan; *ardouiniana*, Heude, *orientalis*, Mabille, and *horrida*, Mabille, from Tonkin; *mouhoti*, Pfeiffer, *massiei* Morlet, and *dautzenbergi*, Morlet, from Laos and Cambodia; *rugifera* from Annam. To these may be added *dorri*, Bav. & Dautz., *giardi*, H. Fischer, and *messageri*, Bav. & Dautz., from Tonkin.

291. **Clausilia tuba**, *Hanley.*

Clausilia tuba, Hanley, A. M. N. H. ser. 4, i, 1868, p. 343; Hanley & Theobald, Conch. Ind. 1870, pl. 24, fig. 9; Sowerby, Conch. Icon. xx, 1875, *Clausilia*, pl. 8, fig. 72; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 540; Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 80 (*inc. sed.*).

Clausilia (*Phaedusa* (*Hemiphaedusa*)) *tuba*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 394.

Clausilia (*Garnieria*) *tuba*, Möllendorff, Jahrb. Deuts. Malak. Ges. xiii, 1886, p. 207; ibid., Nachr. Deuts. Malak. Ges. xxx, 1898, p. 77.

Original description.—"Testa (pro genere) magna, subcylindraceo-fusiformis, apicem versus cylindracea, albido-cornea, unicolor, tenuis, subdiaphana, haud rimata, lineis elevatis vix continuis et (præsertim in anfractu ultimo, ubi remotiores fiunt) oblique corrugata. Anfractibus 10–12, sutura profunda et minime crenata divisi; apicales unice convexi, subæquales; cæteri convexi, et satis rapide crescentes; penultimus major, altior; ultimus curvatus, verticaliter descendens, infra suturam

Fig. 115.—*Clausilia tuba.*

submarginatam subcoarctatus, denique insigniter dilatatus, basi rotundata nequaquam cristatus. Apertura permagna, soluta, porrecta, subcordato-rotundata, undique patentissima. Peristoma continuum, late expansum; lamella supera conspicua, angusta, arcuatim subverticalis; lamella infera adjacens, obliqua, magisque profunda; plica subcolumellaris parvula, verticalis; plica palatalis (si sit ulla) labrum haud attingens; lunella opacitate conspicua.

"Long. 1¼ poll. [=31·5 mm.]." (*Hanley.*)

Hab. Burma: Upper Salween Valley, Shan States (*Fedden*).

Apparently a rare species. It resembles an exaggerated *C. masoni* with wing-like margins of the peristome, but the subcolumellar fold does not reach so far and is placed lower on the columellar margin. The lunella is almost united to the palatal plica above and to the subcolumellar fold near the inner edge of the peristome below. Hanley stated that it most closely resembles the American *C. epistomium*, not a very happy comparison. It certainly has much closer affinity with *C. masoni*, while it also

bears some resemblance to *C. orientalis*, Mab. but is less inflated about the middle. I have only seen two specimens which are in the British Museum. One of these is the type figured in Conch. Ind., measuring 33·5 × 5·75 mm., presented by Mr. Harvey who acquired the Hanley collection by purchase. Hanley's figure is enlarged (41 mm. length), although there is no indication of this fact on the plate. The other shell (here figured with its detached clausilium and the palatal plicæ) is in the Theobald collection and is composed of 12½ whorls, measuring 32 × 5·75 mm. The latter is a very fine specimen, possessing a peristome with more expanded margins.

292. **Clausilia masoni**, *Theobald.*

Clausilia masoni, Theobald, J. A. S. B. xxxiii, part 2, 1864, p. 246; Hanley & Theobald, Conch. Ind. 1870, pl. 24, fig. 8; Sowerby, Conch. Icon. xx, *Clausilia*, 1875, pl. 8, fig. 69; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 540.

Clausilia (? Nenia) masoni, Blanford, J. A. S. B. xli, 1872, p. 206, pl. 9, fig. 18.

Clausilia (Phaedusa) masoni, Nevill, Hand List, i, 1878, p. 184.

Clausilia (Phaedusa (Hemiphaedusa)) masoni, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 394.

Clausilia (Garnieria) masoni, Möllendorff, Jahrb. Deuts. Malak. Ges. xiii, 1886, p. 207; ibid., Nachr. Deuts. Malak. Ges. xxx, 1898, p. 77.

Original description:—"Testa arcuato-rimata, fusiformi, tenui, costulato-striata, pallide castanea. Apice intacto. Sutura excavata. Anfractibus decem, sub-planatis, ultimo angustiore, supra aperturam fortiter striato, juxtaque suturam fossa, laminæ interioris cursum monstrante, notata. Lunella distincta; interdum non. Lamellis quinque, duabus parietalibus tenuibus, distinctis, intus conniventibus; reliquorum binis fortibus ad aperturam divergentibus; tertia post lunellam valde tenui, inconspicua. Apertura rotundato-auriformi-soluta. Peristomate expanso, reflexiusculo.

"Longit. 21 ad. 29 mm. lat. 4 ad. 5 mm." (*Theobald.*)

Hab. Burma: Tonghu (*Theobald*).

In the present species three folds are visible on the upper or parietal margin of the peristome, for in addition to the two parietal folds, present in most species, the subcolumellar fold here also reaches the inside margin, while the upper palatal plica runs close to the peristome. Of the two parietal folds the upper terminates at the outer edge of the peristome, but the lower does not reach quite so far. The clausilium is likewise visible for the greater portion of its length upon looking into the aperture. *Clausilia masoni* is characterized by the rather distant, fine, plicate-striate ribs, which are especially prominent on the latter half of the last whorl.

Subgenus OOSPIRA, *Blanford.*

Oospira, Blanford, J. A. S. B. xli, 1872, p. 205 (type *Clausilia philippiana*, Pfeiffer); Boettger, Palæontographica, 3rd suppl. 1877, p. 64 (as section of *Phaedusa*); ibid., Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 56; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 392.

Type, *Clausilia philippiana*, Pfeiffer.

Range. Burma.

"Shell with but few whorls, usually five or six, and of a peculiar more or less oval form with a very blunt apex. Lunule wanting, palatal plaits as in *Phædusa*.

"The known shells of this section are solid deeply coloured Clausiliæ, smooth or with very slight sculpture. So far as is hitherto known, the type is peculiar to Martaban and Tenasserim." (*Blanford.*)

293. **Clausilia bulbus**, *Benson.*

Clausilia bulbus, Benson, A. M. N. H. ser. 3, xi, 1863, p. 321; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 409; Hanley & Theobald, Conch. Ind. 1870, pl. 24, fig. 5; Sowerby, Conch. Icon. xx, 1875, *Clausilia*, pl. 6, fig. 51.

Clausilia (Oospira) bulbus, Blanford, J. A. S. B. xli, 1872, p. 206, pl. 9, fig. 16.

Clausilia (Phaedusa (Oospira)) bulbus, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 56; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 392.

Original description :—"C. testa sinistrorsa, vix rimata, oblongo-obovata, pupiformi, regulariter oblique striata, rubenti-ferruginea; spira obovata, superne ventricosa, versus apicem obtusum conspira obovata, superne ventricosa, versus apicem obtusum con-camerata, sutura impressa; anfractibus 5½, convexiusculis, primis rapide accrescentibus, antepenultimo tumido, penultimo angustiore, pone aperturam obliqua, oblique auriformi, peristomate continuo, margine late expanso, reflexiusculo, albido-rubente, lamella superiore acuta, prominente, longe, intus intrante, spirali, infera forti, oblique spiraliter ascendente, subcolumellari immersa; plicis palatalibus 7, superiore valde elongata, late erecta, intus cum lamella superiore rimam angustam efformante, 6 inferioribus brevibus, subparallelibus, lunella nulla.

"Diam. anfract. antepenultimi 9, ultimi supra aperturam 5, axis 23 mill.; ap. (oblique), longa 8, lata 7 mill." (*Benson.*)

Hab. Burma: Banks of the Attaran River, near Moulmain.

"This most singular form in the genus was found by Col. Robert Gordon. The bulbous pupiform figure of the shell at once distinguishes it from *Cl. philippiana*, Pfr., an inhabitant of the Farm Caves, as well as from any other known species. The upper lamella runs spirally up the aperture, forming a narrow slit between it and the upper knife-like plica." (*Benson.*)

Clausilia bulbus resembles a large *ovata*, but the striæ are much coarser and farther apart, and there are a few coarse distant spirals, while the last whorl becomes more attenuated behind the peristome. The only shell of *bulbus* I have seen is from Moulmain in the National collection; it is 25 mm. in length, the penultimate whorl measuring 9·5 and the last whorl 5·5 mm. This species, *C. philippiana* and *C. ovata* constitute a natural group, characterized by the very convex spire and the very obtuse apex.

294. **Clausilia philippiana**, *Pfeiffer.*

> *Clausilia philippiana*, Pfeiffer, Zeits. Malak. iv, 1847, p. 69; ibid., Mon. Helic. Viv. ii, 1848, p. 423; ibid., Conch.-Cab., *Clausilia*, 1850, p. 100, pl. 11, figs. 7–9; Hanley & Theobald, Conch. Ind. 1875, pl. 118, fig. 10; Sowerby, Conch. Icon. xx, 1875, *Clausilia*, pl. 4, fig. 35.
>
> *Clausilia* (*Phædusa*) *philippiana*, Adams, Gen. Rec. Moll. ii, 1855, p. 184; Pfeiffer, Malak. Blätt. ii, 1856, p. 180; von Martens, Die Heliceen, ed. 2, 1860, p. 275.
>
> *Clausilia* (*Phedusa*) *philippiana*, Stoliczka, J. A. S. B. xl, 1871, p. 174, pl. 6, figs. 7–10 (anatomy).
>
> *Clausilia* (*Oospira*) *philippiana*, Blanford, J. A. S. B. xli, 1872, p. 205, pl. 9, fig. 14; Kobelt, Conchyl. Buch, ii, 1878, p. 289, pl. 86, fig. 29; Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 329.
>
> *Clausilia* (*Phaedusa* (*Oospira*)) *philippiana*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 56; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 392.

Original description:—"T. vix rimata, abbreviato-fusiformis, crassa, solida, subtilissime striatula, castanea; spira ventrosa, apice obtusissima; anfr. 6, primi 3 planiusculi, penultimus convexus, ultimus angustior, basi rotundatus; apertura verticalis, oblique semiovalis; lamellae validae, approximatae; plica lunata imperfecta vel obsoleta, palatalis 1 longa, suturae parallela, columellaris immersa; perist. crassum, continuum, superne subadnatum, marginibus late expansis, columellari perobliquo, externo strictiusculo.

"Long. 21, diam. 7¾ mill.; ap. oblique 7 mm. longa, 5 lata." (*Pfeiffer.*)

Hab. Burma: Mergui (*Philippi*); Farm Caves, Moulmain (*Stoliczka, Theobald, Hungerford, Fea*); Attaran Valley and Tenasserim (*Theobald*). Mergui Archipelago: Sullivan Island (*Anderson* fide *Tapparone Canefri*).

Clausilia philippiana forms a connecting link between *C. bulbus* and *C. ovata*, differing from the latter in the length being greater in proportion to the diameter, in the upper part of the spire being more slender, and in the wider aperture, while it is decidedly less ventricose about the middle than the former. The palatal plicæ vary from seven to nine in number, the first being very long, the second about half the length of the first, and the remainder very short; they are all nearly parallel.

The specimen figured by Hanley has been presented to the British Museum by Mr. Harvey; it is composed of 6½ whorls and measures 26 × 8·25 mm. Three shells in the Cuming collection, from Moulmain, range in size between 22·5 mm. and 23 mm. and in diameter from 7·75 mm. to 8 mm. The Theobald collection contains shells also from Moulmain and Mergui, of 6 and 6½ whorls, measuring 21·5 × 7·5 and 25·5 × 8 mm. respectively. Lastly some specimens in the Beddome collection are blackish brown in colour, varying in length from 21·5 to 23·5 mm., and in diameter from 6·25 to 7·5 mm.

295. **Clausilia ovata**, *Blanford.*

Clausilia (Oospira) ovata, Blanford, J. A. S. B. xli, 1872, p. 206, pl. 9, fig. 17; Nevill, Hand List, i, 1878, p. 183.
Clausilia ovata, Hanley & Theobald, Conch. Ind. 1875, pl. 118, fig. 4; Sowerby, Conch. Icon. xx, 1875, *Clausilia*, pl. 7, fig. 60; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 469.
Clausilia (Phaedusa (Oospira)) ovata, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 56; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 392.

Original description:—"Testa vix subrimata, elongata-ovata, pupiformis, intense rufo-ferruginea, regulariter confertimque striata; spira tumida, apice convexo, sutura parum impressa. Anfr. 5·5 convexiusculi, primi rapide accrescentes, antepenultimus maximus, penultimus vix minor, ultimus ad basin rotundatus. Apertura auriformis, fere verticalis, juxta anfractum penultimum repanda, lamella supera acuta, antice validiore, fere verticali, infera stricta; lunella nulla, plicis palatalibus 7, supera producta, in fauce aperturæ conspicua, suturæ parallela, secunda curvata, cæteris brevibus obliquis.

"Long. 19, diam. 7 mm.; apert. oblique 6 longa, 4·5 lata." (*Blanford.*)

Hab. Burma: Nattoung near Moulmain (*Theobald*); Attaran Valley (*Hungerford*).

"It is more ovate than *C. Philippiana* and *C. vespa*, smaller and less tumid than *C. bulbus*." (*Blanford.*)

In addition to the differentiating characters alluded to by Blanford, *C. ovata* has a shorter spire which increases more suddenly than in *philippiana*, the whorls are less tumid, and it possesses fine spirals, which are lacking in its ally. There are some shells in the British Museum from Pathingtoun, Attaran Valley, measuring 18 × 6·75 mm., others from Nattoung, the type locality, and Moulmain have the spire still more convex, the former having a diameter of 7 mm. with a length of 17·75 mm., and the latter being 18 × 8 mm. The shell figured by Hanley is also in the National collection, having been presented by Mr. Harvey; it measures 18 × 7 mm.

296. **Clausilia stoliczkana**, *Sykes.*

Clausilia (Oospira) vespa, Blanford & Stoliczka (non Gould), J. A. S. B. xli, 1872, pp. 205 & 209, pl. 9, figs. 15, 15 *a*.
Clausilia vespa, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 468.
Clausilia (Oospira) stoliczkana, Sykes, The Conchologist, ii, 1893, p. 166.

Original description:—"Cl. testa ovato-cylindricea, ad apicem obtusa, albida, medio subinflata, ultimo anfractu sensim attenuata, haud rimata, fusco-castanea; anfractibus sex, convexiusculis, sutura simplicijunctis, transversim oblique et confertissime striolatis; apertura subovata, postice rotundate subangulata, antice late sub-effusa, intus violaceo-rufa, peritremate modice expanso, interno oblique fere recto, libero; lamellæ sub-parallelæ, fuscæ, ad marginem attingentes; plicæ palatales 8–9, suprema (principalis) longa, alteræ breviores et inter se valde inæquales.

"Alt. 25 millim., lat. 7 millim.; apert. alt. $6\frac{1}{4}$ millim., lat. 5 millim." (*Stoliczka.*)

Hab. Burma: Tavoy.

The above description of what Blanford and Stoliczka regarded as Gould's *Clausilia vespa*, is copied by Mr. Sykes, who considered that neither the description nor the figures represented Gould's species. He observes "The specimen figured by Mr. Stoliczka is, I believe, one which has been since received by the British Museum from Mr. Theobald. There are two species in the British Museum under the name of *vespa*, Gould; one which I regard as really that species from the Hungerford collection, and the other from Mr. Theobald, which I regard as the species and specimen described and figured by Mr. Stoliczka. What the shell is which is figured by Dr. Blandford [Blanford] as *vespa* is, the absence of description makes it hard to say; Dr. Blandford himself says it is hard to separate from *philippiana*, and it is probably only an elongated specimen of that species."

He states that Gould's description is very brief, which he then quotes, and continues "The description will not fit Mr. Stoliczka's shell, as in this latter the colour is not '*intense rufa*,' the apex is blunt not '*anfr. apicalibus cito descrescentibus*,' i. e., resembles the end of a cylinder rather than the point of a cone, no whorl can be said to be '*corpulentus*,' the suture is not '*vix marginata*,' but simple, the aperture is not '*ovata*' but subovate, the lip is not '*late reflexus*' or '*rufus*.'

"On the other hand, so far as it goes, Gould's description does fit the Hungerford shell, which is not very blunt in the apex like the others of the *Oospira* section, which is a dusky red, like *philippiana*, and has a very thick and expanded dark lip.

"I therefore consider Mr. Stoliczka's shell as not *vespa*; it is as far as I know, an undescribed species, and I adopt his description of it and call it *Stoliczkana*."

An examination of the shell in the Theobald collection, upon which Mr. Sykes has based his new species, has convinced me that

as regards outline, it fits Blanford's figure (fig. 15) better than Stoliczka's (fig. 15 *a*) but in the former the striæ appear more distant, and it shows rather more sinus at the upper parietal fold.

297. **Clausilia vespa**, *Gould.*

Clausilia vespa, Gould, Proc. Boston Nat. Hist. Soc. vi, 1859, p. 13; ibid., Otia Conch. 1862, p. 220; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 409; Sykes, The Conchologist, ii, 1893, p. 166, 3 text-figures.
Clausilia (*Oospira*) *vespa*, Nevill, Hand List, i, 1878, p. 183.

Original description :—"T. solida, sinistrorsa, vespæformis, deflecta, lævis, intense rufa; anfr. 6, anteriori raptim attenuato, proximo corpulento apicalibus cito descrescentibus; sutura impressa vix marginata; apertura ovata; columella biplicata; peritremate late reflexo, rufo.

"Long. 1 [=25·25 mm.], lat. $\frac{3}{10}$ poll. [=7·5 mm.]." (*Gould.*)

Hab. Burma: Tavoy (*Mason*); Hooden Koo, Salween Valley (*Hungerford*); Tenasserim (? *Mason*).

Mr. Sykes, as already stated under *C. stoliczkana*, has pointed out that the shell described and figured by Stoliczka and Blanford as *C. vespa*—which he believes has been received by the British Museum from Mr. Theobald—differs in several respects from Gould's species, and he regards it as a new form. On the other hand a shell in the British Museum, from the Hungerford collection, he believes to be the true *vespa* and adds a diagnosis, based upon this specimen, to supplement the very brief description by Gould. His diagnosis is as follows:—

"Cl. testa solida, sinistrorsa, fusiformis, medio inflata, apex obtusiuscula, subtile et indistincte decussata, haud nitida, intense rufa, ad apicem pallidior; anfr. 6, apicales cito decrescentes, penultimus et ante penultimus inflati, corpulenti; sutura impressa vix marginata; apertura ovata, peritremate late et valde reflexo, rufo; lamella superior valida, obliqua, rufa, fere ad marginem attingens, l. inferior valida rufa subparallela; plicæ palatales 5–6, suprema (principalis) longa, secunda brevior, descendens, reliquæ parvæ, subæquales descendentes.

"Alt. 27 millim., lat. 8 millim.; apert. alt. 7 millim., lat. 5½ millim.

"*Cl. vespa*, Gould, must be withdrawn from the *Oospira* section both on the ground of shape and its sculpture (an indistinct decussation) and *Cl. stoliczkana* should take its place." (*Sykes.*)

Through the courtesy of Dr. John M. Clarke, the Director of the State Museum of Albany, N.Y., I have been able to examine one of the two specimens of Gould's *C. vespa*, and I am in a position to confirm Mr. Sykes' surmise that the shell figured as *vespa* by Stoliczka is quite different from Gould's species. The specimen sent to me by Dr. Clarke is smaller than the one in the Hungerford collection, figured by Mr. Sykes, measuring: length 25,

breadth 7·6 mm. and, except in being rather weatherworn, it completely resembles the latter. Dr. Clarke informs me that the second Gouldian specimen is almost exactly like the one sent, except that it is a trifle shorter and stouter, measuring 24 × 8 mm., the last whorl especially being proportionately shorter and less contracted, although there is very little difference in the apertures. I have taken the opportunity of giving an illustration of Gould's shell.

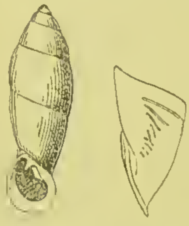

Fig. 116.—*Clausilia vespa.*
(From one of Gould's original specimens.)

I am unable to follow Mr. Sykes when he states that *C. vespa* must be removed from the *Oospira* section, for in spite of the fact that in establishing this section Blanford described the apex as very blunt, and that *vespa* has the apex rather acute, the whole aspect and consistency of the shell of *vespa* resemble those of the other members of the group to such an extent that I prefer to retain it as a member of the section, abnormal only in the apex.

Subgenus **CYLINDROPHÆDUSA**, *Boettger.*

Cylindrophaedusa, Boettger, Palæontographica, 3rd suppl. 1877, p. 64; Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 42 (only species *Clausilia cylindrica*); Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 392.

Type, *Clausilia cylindrica*, Pfeiffer.

Range. India.

Principal fold long, palatal plicæ 2 æquidistant, deep seated. Lunella absent. Upper parietal lamella oblique, marginal, contiguous with the spiral fold; lower parietal lamella almost straight, ascending obliquely, becoming bifurcate inside. Subcolumellar fold very deep-seated, not visible from outside. Aperture small, rhomboid-ovate, the margins of the peristome scarcely thickened and slightly reflexed. Shell small, usually decollate, almost cylindrical, with slowly increasing whorls, corneous, striated or costulate-striate.

298. Clausilia cylindrica, *Pfeiffer.*

Clausilia cylindrica (Gray), Pfeiffer, Symb. Hist. Helic. iii, 1846, p. 93; ibid., Mon. Helic. Viv. ii, 1848, p. 428; ibid., op. cit. iii, 1853, p. 590; ibid., Zeit. Malak. vi, 1849, p. 95; Küster, Conch.-

Cab., *Clausilia*, 1850, p. 101, pl. 11, figs. 12–16; Blanford, J. A. S. B. xli, 1872, p. 199, pl. 9, fig. 1; Stoliczka, tom. cit. p. 207; Sowerby, Conch. Icon. xx, 1875, *Clausilia*, pl. 2, fig. 18; Theobald, J. A. S. B. xlvii, 1878, p. 146; ibid., op. cit. 1, 1881, p. 48.

Clausilia (*Phaedusa*) *cylindrica*, Nevill, Hand List, i, 1878, p. 185.

Clausilia (*Phaedusa* (*Cylindrophaedusa*)) *cylindrica*, Boettger, Ber. Offenbacher Ver. Naturw. 1878, Mitt. p. 57; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 393.

Clausilia elegans (Hutton MS.) Pfeiffer, Zeit. Malak. vi, 1849, p. 95 (as synonym of *C. cylindrica*).

"T. subrimata, adulta plerumque truncata, subcylindrica, oblique striata, nitide cornea vel rufescens; sutura submarginata; anfr. superst. 6–7 subaequales, ultimus antice costulato-striatus, basi rotundatus; apertura subverticalis, pyriformis; lamellae parvulae, conniventes, infera substricte ascendens, superne furcata; lunella nulla; plicae palatales 3 parallelae, summa elongata, reliquae breves, subcolumellaris inconspicua; perist. continuum, vix solutum, albidum, breviter reflexum.

"Long. (trunc.) 13, diam. 3 millim.; ap. 3 mm. longa, 2 lata." (*Pfeiffer*, 1853.)

Hab. India: Landour (*Gray*); Mussoorie (*Beddome*); Dharmsala, east of the Ravi (*Theobald*, 1878); Tandiani and Mari [Murree], Punjab (*Theobald*, 1881); Murree (*Stoliczka*); Naini Tal and Simla (*Stoliczka*, *Oldham*); Tezpur, Assam (*Stoliczka*).

Fig. 117.—*Clausilia cylindrica*.

"The figure in the 'Conchologia Indica' is that of a specimen which, although adult, has retained its apex. This is a very rare occurrence. The figure now given represents the shell as it is usually found.

"Three palatal plaits, the upper elongate, are always present, and beneath them there is occasionally to be found a rudimentary lunella. The characters both of the shell and of the internal plication differ widely from those of typical *Phædusa*, in which sub-genus I do not think that the present species can be included. It stands by itself, and I am inclined to look upon it as the type of a peculiar section." (*Blanford*.)

The species seems to be fairly common since I have seen large numbers in various collections. As mentioned by Blanford, the shells are nearly always decollated. It is rather surprising that in drawing attention to the specimen figured by Hanley & Theobald he failed to notice that the figure in question does not

represent *cylindrica*, but quite a distinct form which has since been separated and named *Clausilia turritella* by Sowerby. Amongst the numerous specimens of *C. cylindrica* examined by me the only entire shells I have seen are two in my own collection, which were acquired many years ago amongst a miscellaneous lot at a sale. One of these is now figured. It is composed of 14 whorls, the first seven being opaque white, owing to the withdrawal of the animal from that portion of the shell. That this is a case of true decollation I have satisfied myself by examining numerous shells with six or seven whorls; in each case the newly formed apex could distinctly be seen.

299. **Clausilia turritella**, *Sowerby*.

Clausilia cylindrica, Hanley & Theobald (non Pfeiffer), Conch. Ind. 1870, p. 12, pl. 24, fig. 4.
Clausilia turritella, Sowerby, Conch. Icon. xx, 1875, *Clausilia*, pl. 7, fig. 65.
Clausilia elegans, Hutton, MS.

Original description:—"Shell yellow, very narrow elongated, pyramidal; whorls 14, slowly increasing, rather convex, last oblong; aperture oblong, rather square, with a single plait over the columella, columella straight." (*Sowerby*.)

Long 16·75 mm. (*ex icon.*).

Hab. India: Landour.

The shell from Landour figured by Hanley & Theobald as *Clausilia cylindrica* of Gray, copied by Sowerby, is altogether different from that species as described and figured by Pfeiffer, so that Sowerby was quite justified in giving it a new name. In *turritella* the whorls are more convex, the aperture is much narrower and higher, and the shell much paler in colour. It is rather unfortunate that the whereabouts of Hanley's specimen is unknown. It was not amongst the shells from Hanley's collection presented to the British Museum by Mr. Harvey.

Family ACHATINIDÆ.

Subfamily ACHATININÆ.

Genus **ACHATINA**, *Lamarck*.

Achatina, Lamarck, Mém. Soc. Hist. Nat. Paris, An vii (1799), p. 75; Fischer, Man. Conchyl. 1883, p. 486; Pilsbry, Man. Conch. ser. 2, xvii, 1904, p. 1.

Type, *Bulla achatina*, Linné.

Range. Tropical Africa (one species naturalized in India).

Shell ovate or oblong, with conic spire and small apex, two or three earliest whorls smooth, forming a trochiform nucleus, obtuse

at the apex. Aperture ovate, the outer lip unexpanded; columella concave or straight, truncate as though cut off below.

Reproduction oviparous, the eggs small, oval and pale yellow, numerous.

300. **Achatina fulica**, *Férussac.*

Helix fulica, Férussac, Tabl. Syst. Limaçons, 1821, p. 49 (p. 53 of some editions), no. 347 (nom. nud.); ibid., Hist. Nat. Moll. pl. 124 A, fig. 1, pl. 125, figs. 3–5.

Achatina fulica, Deshayes, Anim. sans vert. ed. 2, viii, 1838, p. 297, footnote; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 254; Reeve, Conch. Icon. v, 1849, *Achatina*, pl. 2, fig. 8, pl. 3, fig. 8 *b*; Deshayes in Férussac, Hist. Nat. Moll. ii, part 2, 1851, p. 162; Benson, Journ. Conchyl. vii, 1858, p. 266; Semper, Reisen Arch. Philippinen, Landmoll. 1873, p. 143, pl. 12, fig. 17 (anatomy); Nevill, Hand List, i, 1878, p. 145; Kobelt, Ill. Conchyl. Buch, ii, 1878, p. 262, pl. 81, fig. 1; Bourguignat, Moll. Afrique Equat. 1889, p. 76; Pilsbry, Man. Conch. ser. 2, xvii, 1904, p. 55, pls. 36, 37; Annandale, Rec. Ind. Mus. i, 1907, p. 176.

Achatina (*Achatinus*) *fulica*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 266.

Shell ovate-conoid, pale yellowish, streaked transversely with brown, somewhat glossy, more or less irregularly decussated with fine spirals, except on the last whorl. Spire convex, suture impressed, apex acute. Whorls 8, convex, the last nearly equalling half the entire length of the shell. Aperture elliptic ovate, white or pale lilac within; peristome straight, acute, the margins connected by a callus on the parietal wall; columella slightly concave, truncate.

Length 94, diam. 45 mm.; apert. 48 mm. (Calcutta specimens).

Hab. India: Calcutta (introduced) (*Nevill*). Madagascar; Mascarenes; Seychelles; Comoro Islands; Zanzibar.

A native of Madagascar, *Achatina fulica* was, according to Lesson, introduced in Mauritius and Bourbon. In addition, it has been recorded from the Seychelles, the Comoro Islands, and Zanzibar. Although not being, strictly speaking, a native of India, it has been thought advisable to include it since it appears to have established itself thoroughly.

The history of its earlier transport is not known, but Benson has placed on record how he carried living specimens from the Mauritius to Calcutta, where they were turned loose. After his return to England he received news that it had multiplied in neighbouring estates and was spreading. Hutton took some specimens from Calcutta to Mussoorie, where they continued to breed, but a severe winter exterminated them. Dr. Annandale reports that it is common in gardens in Calcutta and neighbourhood, and that it is said to be spreading in other parts of India. Pilsbry figures a shell from the Botanic Gardens, Calcutta.

Subfamily STENOGYRINÆ.

Genus SUBULINA, *Beck.*

Subulina, Beck, Index Moll. 1837, p. 76 (in part); Gray, P. Z. S. 1847, p. 177; Herrmannsen, Ind. Gen. Malac. ii, 1849, p. 522; Pilsbry, Man. Conch. ser. 2, xviii, 1906, pp. 71, 220.

TYPE, *Bulimus octonus*, Bruguière.

Range. Tropical America and Africa; one species—*octona*—introduced into India.

"Shell *imperforate* at all stages of growth, narrow, turrited, or subulate, thin, corneous or brownish, usually more or less translucent; apex obtuse, rounded; the embryonic shell either smooth, plicate below the sutures or vertically ribbed. Last whorl angular or rounded at the periphery. Aperture small, oblique, ovate, the *columella concave above, obliquely or abruptly truncate at base.* Eggs with a calcareous, oblately spheroidal capsule.

"Beck originally proposed the name *Subulina* for the following species:—(1) *S. cyanostoma* Rüpp., (2) *turritellata* Desh., (3) *striatella* Rang, (4) *malaguetana* Rang, (5) *monoceros* Beck, (6) *propinqua* Beck, (7) *terebraster* Lam., (8) *octona* Ch., (9) *crotalariae* Schum., (10) *carinulata* Beck, (11) *pupaeformis* Beck, (12) *S.* ? *seriata* Beck. The first species of the list was made type of *Homorus* by Albers, 1850; species 6, 10, 11, 12, are nude names; 7 is an *Obeliscus*; 2 and 4 are species of uncertain generic relationships; leaving species 3, 5, 8, 9 to represent the group of *S. octona.* Gray in 1847 and Herrmannsen, 1849, agreed in selecting as type of *Subulina* the commonest and best known species, *S. octona*—a course approved by practically all later writers who have recognized the group." (*Pilsbry.*)

301. **Subulina octona**, *Bruguière.*

Bulimus octonus, Bruguière, Encycl. Méth., Vers, i, 1789, p. 325.
Achatina octona, Gray, Ann. Philos. N. S. ix, 1825, p. 414; Menke, Syn. Meth. ed. 2, 1830, p. 29; Potiez & Michaud, Galérie Douai, i, 1838, p. 129, pl. 11, figs. 13, 14; Orbigny in Ramon de la Sagra, Hist. fis. pol. nat. Cuba, Moll. i, 1841, p. 168, pl. 11, figs. 4, 6; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 266; Reeve, Conch. Icon. v, 1849, *Achatina*, pl. 17, fig. 84; Sowerby, Conch. Man. 1852, fig. 514; Pfeiffer, Conch.-Cab., *Achatina*, 1854, p. 342, pl. 37, figs. 19, 20.
Subulina octona, Beck, Index Moll. 1838, p. 77; Adams, Gen. Rec. Moll. ii, 1855, p. 110, pl. 71, fig. 3 *a*; Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 72, pl. 12, figs. 8, 9; p. 222, pl. 39, figs. 28–37, 39, 40.
Stenogyra (Subulina) octona, Kobelt, Illustr. Conchyl. Buch, ii, 1878, p. 276, pl. 84, fig. 29; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 326.

Stenogyra octona, Peile, Journ. Bombay Nat. Hist. Soc. xii, 1909, p. 785.

Subulina crotallaria (Schumacher), Mörch, Journ. Conchyl. 1872, p. 337.

Original description :—"Bulimus, testa cylindrica, turrita, cornea, anfractibus octo, apice obtuso.

"La coquille n'est point ombiliquée ni perforée, elle est cylindrique, turriculée, rousse, transparente et composée de huit tours presque applatis, qui sont separés par des sutures profondes. Le sommet de la spire est obtus ou arrondi, il est ordinairement plus transparent que les tours inférieurs et très fragile. Leur superficie est luisante et marquée de quelques stries longitudinales, écartées, qui sont les traces des accroissemens successifs de la coquille. Son épiderme est brun, mais facile à enlever, excepté dans les sutures ou il en reste toujours assez pour y paroitre comme une ligne spirale noirâtre. L'ouverture est ovale, une fois plus longue que large, elle est un peu oblique, arrondie à son extrémité inférieure et rétrécie au bout supérieure. La lèvre droite est simple, très mince et tranchante, la gauche manque tout-à-fait, mais sa région est lisse, très luissante et aussi diaphane que les trois derniers tours du sommet." (*Bruguière.*)

"Shell thin, translucent, yellowish corneous, turrited, almost regularly tapering to the obtuse summit, very glossy, rather coarsely and irregularly striatulate. Whorls 9, quite convex, separated by a deeply impressed suture, the first three turns of which are regularly crenulated by a border of short folds. On the later whorls it is also irregularly crenulate in places. Last whorl rounded. Aperture oblique, ovate; columella concave above, obliquely truncate at its base." (*Pilsbry.*)

Length 15·5–19, diam. 4–4·5 mm.

Hab. India : Tranquebar (*Spengler* fide *Mörch*); Bombay (*Peile*, Beddome coll.). Ceylon (*Collett*).

"Reproduction begins before the shell has attained two-thirds its maximum size, and usually several eggs may be seen through the shell within the penultimate whorl. The egg-capsules are hard-shelled, white and flattened, measuring 1·8 × 1·5 mm." (*Pilsbry.*)

Subulina octona is certainly one of the most widely distributed molluscs, being found not only in the Western Hemisphere, believed to be its original home, but also in the Eastern Hemisphere, having apparently followed in the wake of tropical and subtropical cultivation. Prof. Pilsbry has examined numerous specimens from the West Indies, North and South America, West Africa, the Seychelles, Ceylon, Sumatra, and Ternate, and he is satisfied of their identity. The species has also been recorded from East Africa, Mauritius, many other East Indian islands, New Caledonia, and as far as the New Hebrides, while its occurrence in hot-houses in Europe and North America lends colour to the theory of its dispersal through cultivation.

Bruguière's description is not very clear and I have therefore added the diagnosis given by Pilsbry in his admirable account of the species. The bibliography covers more than two octavo pages, but I have limited myself to the principal references and those having any bearing on its occurrence in the Indian region.

The Beddome collection in the British Museum contains, amongst specimens from numerous widely separated localities, three shells from Bombay, composed of ten whorls and measuring 19 mm. in length.

Genus **BACILLUM**, *Theobald.*

Bacillum, Theobald in Hanley & Theobald, Conch. Ind. 1870, p. 17 (as subgenus of *Achatina* for *A. obtusa*, Blanford, and *A. casiaca*, Benson); Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 1.

TYPE, *Achatina casiaca*, Benson.

Range. Eastern India.

"Shell rather large, solid, imperforate, turrited, many-whorled, a little contracted near the obtuse, rounded summit, the embryonic shell cylindric; sculpture of vertical rib-striæ beginning somewhere upon the first whorl: the post-embryonic whorls being obliquely, regularly rib-striate. Aperture oblique, Achatinoid, the columella concave, truncate at the base, outer lip simple. Internal axis slender, strongly sigmoid within each whorl. Soft anatomy unknown." (*Pilsbry.*)

"This group would hardly be thought distinct from *Homorus*, were it not well separated geographically from that African genus, at least in the recent fauna. Almost the sole distinguishing feature is the stronger sculpture of *Bacillum*. Both groups are merely large and solid forms of the *Subulina* type, so far as the shells are concerned." (*Pilsbry.*)

302. **Bacillum daflaensis**, *Godwin-Austen.*

Glessula daflaensis, Godwin-Austen, J. A. S. B. xlv, 1876, p. 316, pl. 8, fig. 10.

Original description:—"Shell elongately turreted, thick, obliquely striate, covered with a thick olive-green epidermis with a few dark streaks. Spire turreted, slightly convex in outline, apex blunt; whorls 11, rather flat, specimens with the apex preserved shewing erosion of the surface. Suture well marked. Aperture oblique, suboval, pale grey. Peristome acute, columellar margin slightly curved and but little thickened.

"Alt. 1·9 [=48 mm.], major diam. 0·41 [=10·5 mm.], alt. ap. 0·42 [=11 mm.]." (*Godwin-Austen.*)

Hab. India: Shengorh Peak, Dafla Hills (*Godwin-Austen*).

"This shell would appear to have a close connection with *G. erosa*, H. Blf., from Darjiling, but its much longer form,

greater number of whorls, and the different colour of its epidermis (which is uniform throughout), at once distinguish it. As in *G. erosa*, the position of the former apertures is distinctly indicated on the whorls." (*Godwin-Austen.*)

This species appears to have been overlooked by Pilsbry when monographing the genus in the Manual of Conchology.

303. **Bacillum erosum**, *Blanford.*

Glessula erosa, Blanford, J. A. S. B. xl, 1871, p. 43, pl. 2, fig. 7; Nevill, Hand List, i, 1878, p. 172; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331.
Achatina (Electra) erosa, Hanley & Theobald, Conch. Ind. 1874, pl. 78, fig. 5.
Achatina erosa, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 283.
Bacillum erosum, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 4, pl. 1. figs. 9–11.

Original description:—"Testa elongato-turrita, crassula, parum nitens, haud diaphana, longitudinaliter oblique striata, epidermide fusco-straminea induta. Spira turrita, lateribus convexiusculis; apice truncato. Anfractus apicales carentes; superstites 7 subplanati; superiores plerumque plus minusve decorticata et erosi; sutura impressa. Peristoma simplex, acutum. Columella leniter arcuata, ad basin oblique truncata.

"Alt. 35, diam. 10, aperturæ alt. 10, lat. 5 mm.

"Alt. 36, diam. 10·5, aperturæ alt. 10, lat. 5 mm.

"Alt. 34, diam. 9, aperturæ alt. 9, lat. 5 mm." (*Blanford.*)

Hab. Sikkim: Darjeeling (*Atkinson & Stoliczka*).

"This species is easily distinguished from its local associate *G. tenuispira*, Bens., by its thickness and opacity, and by the character of the surface, which has none of the vitreous lustre so characteristic of the genus. The upper whorls are generally much eroded; the lower, which retain the epidermis, are of a dark straw colour with darker oblique bands at intervals, apparently marking stages of growth. Under a lens very fine dark spiral lines are also perceptible. I received several specimens of this shell in 1863 from Mr. W. S. Atkinson, but it has not hitherto been described. It appears to be a rare species. Dr. Stoliczka only got two specimens in forest at the waterfall about 1000 feet below Darjeeling." (*Blanford.*)

The only specimen I have seen is one presented by Dr. Joseph Hooker to the British Museum, and probably collected by him during his famous travels in the Sikkim Himalayas. This shell is decollated, seven whorls remaining, and it measures: length 38 mm., diameter 12 mm.

304. **Bacillum theobaldi**, *Hanley.*

Achatina (Electra) theobaldi, Hanley MS., Hanley & Theobald, Conch. Ind. 1870, p. 9, pl. 17, fig. 5.

Achatina (Glessula) theobaldi, Theobald, J. A. S. B. xxxix, 1871, p. 395 (no description).
Achatina theobaldi, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 290.
Stenogyra (Glessula) theobaldiana, Nevill, Hand List, i, 1878, p. 172.
Stenogyra (Subulina) theobaldi, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 327.
Bacillum theobaldi, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 4, pl. 1, fig. 8.

Original description :—" Differs from *A. cassiaca*, of which it has been considered a variety, by its smoothness, more convex whorls, &c." (*Hanley & Theobald.*)

Long. 42, diam. maj. 11 mm. (*ex icon.*).

I have not seen specimens.

305. **Bacillum casiacum**, *Reeve.*

Achatina cassiaca (Benson), Reeve, Conch. Icon. v, 1849, *Achatina*, pl. 17, fig. 85; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 499; ibid., Conch.-Cab., *Bulimus*, 1856, p. 310, pl. 25, fig. 1.
Subulina cassiaca, Adams, Gen. Rec. Moll. ii, 1855, p. 110.
Achatina (Subulina) cassiaca, Pfeiffer, Malak. Blätt. ii, 1856, p. 169.
Achatina (Bacillum) cassiaca, Theobald, Conch. Ind. 1870, p. 17, pl. 36, fig. 5.
Achatina casiaca, Godwin-Austen, P. Z. S. 1872, p. 517, footnote.
Glessula casiaca, Godwin-Austen, J. A. S. B. xliv, 1875, p. 3; xlv, 1876, p. 316.
Stenogyra (Glessula) casiaca, Nevill, Hand List, i, 1878, p. 172.
Stenogyra (Subulina) cassiaca, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 327.
Bacillum cassiacum, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 3, pl. 1, figs. 5–7.

Original description :—" Shell elongately subulate, apex somewhat papillary, whorls fourteen to fifteen in number, flat, obliquely very closely and somewhat rudely sculptured with rib-like striæ, sutures impressed. Columella arched, abruptly truncated; whitish, covered with a thin olive-brown epidermis. The rib-like striæ of this fine species, contributed by Mr. Benson, have an oblique plicate growth." (*Reeve.*)

Hab. India: Naga Hills (*Roberts*); Toruputu, Naga Hills and Dafla Hills (*Godwin-Austen*); N. Cachar Hills (*Pilsbry*).

Reeve, when describing and figuring the species, attributed it to the Cassia [Khasi] Hills, but Lt.-Col. Godwin-Austen states (P. Z. S. 1872, p. 517, footnote) that he obtained it in the Naga Hills, never in the Khasi. Later he again referred to it (J. A. S. B. xlix, 1875, p. 3) saying that he suspected Griffith's specimens were obtained in the Naga Hills and sent to Benson, who imagined they were from the Khasi Hills.

The Beddome collection contains four specimens, from the Naga Hills, which have the following dimensions:—

1°. Length 64 mm., diam. 12 mm. (14 whorls).
2°. ,, 74·5 mm., ,, 12·5 mm. (14 whorls, apex broken).
3°. ,, 74 mm., ,, 13·5 mm. (15 whorls).

The first shows the remains of an epiphragm and contained a spherical calcareous egg 2·7 mm. in diameter; two of the shells are provided with a thick callus on the parietal wall, one forming a raised ridge.

There are besides in the British Museum, from the Khasi Hills, four specimens measuring 58 × 11 mm.

306. **Bacillum muspratti**, sp. n.

Shell elongate-turrite, solid, dull, closely and irregularly striated, showing indistinct traces of spirals, covered with a deciduous straw-

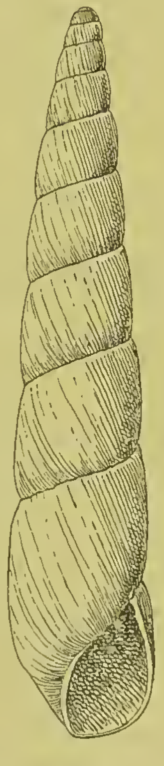

Fig. 118.—*Bacillum muspratti.* $\frac{3}{2}$.

coloured cuticle. Spire elongate with straight sides, suture rather shallow, apex obtuse. Whorls $10\frac{1}{2}$, flattened, increasing slowly at first, then rather suddenly, the last whorl equalling about $\frac{1}{5}$ of the

entire length of the shell. Aperture oblique, pyriform, peristome thickened, not reflexed or expanded, the margins united by a thick callus on the parietal wall; outer margin curving forward, basal margin slightly arcuate, columella curved, only slightly truncate.

Length 59, diam. 12 mm.; apert. height 13, width 6 mm.

Hab. India: Naga Hills, Assam (*Beddome*).

Type in the British Museum.

Differs from *B. casiacum* in the smaller number of whorls, which increase more rapidly, in the absence of costæ, and in the apical portion being more acuminate.

A single unnamed specimen in the Beddome collection I also refer to this species. It is in a rather worn state, but the later whorls show a portion of the periostracum in fair condition.

307. **Bacillum obtusum**, *Blanford.*

Achatina (*Glessula*) *obtusa*, Blanford, P. Z. S. 1869, p. 449.
Achatina (*Bacillum*) *obtusa*, Hanley & Theobald, Conch. Ind. 1870, pl. 36, fig. 6.
Achatina obtusa, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 290.
Glessula obtusa, Nevill, J. A. S. B. xlvi, 1877, p. 25; ibid., in Anderson, Zool. Res. Exp. W. Yunnan, i, 1879, p. 886.
Stenogyra (*Subulina*) *obtusa*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 327.
Bacillum obtusum, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 1, pl. 1, fig. 1.

Original description:—"Testa elongato-turrita, albido-cornea, cerea, solidiuscula, confertim flexuose plicato-striata, infra suturam plicata. Spira elongata, ad apicem subcylindracea, apice perobtuso papillari, sutura vix impressa subcorrugata. Anfr. 12–14, fere planulati, ultimus ad peripheriam subangulatus. Apertura obliqua, subovata; peristoma simplex, rectum.

"Long. 48–52, diam. 10–11; ap. long. 10–11, lat. 5–5½ mill.; apex 3 mill. latus." (*Blanford.*)

Hab. Burma: Bhamo (*Anderson*).

"Very close to *A. cassiaca* Bens., but distinguished by finer sculpture, narrower and less numerous whorls, and much more obtuse apex." (*Blanford.*)

On close examination *B. obtusum* looks quite distinct from *casiacum*, owing to the spire being concave near the apex; this arises from the fact that the first and second whorls are a trifle wider than the third and fourth, and the apex consequently becomes very obtuse. The later whorls increase very slowly and regularly. The base is also broader proportionately than in *B. casiaca.*

The Theobald collection contains three specimens from the type locality measuring 51 × 11 mm.

308. **Bacillum orthoceras**, *Godwin-Austen.*

Glessula orthoceras, Godwin-Austen, J. A. S. B. xliv, 1875, p. 2, pl. 1, fig. 4; op. cit. xlv, 1876, p. 316.
Achatina orthoceras, Hanley & Theobald, Conch. Ind. 1876, pl. 159, fig. 6.
Stenogyra (*Glessula*) *orthoceras*, Nevill, Hand List, i, 1878, p. 172.
Stenogyra (*Subulina*) *orthoceras*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 327.
Bacillum orthoceras, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 2, pl. 1, figs. 2, 3, 12.

Original description.—"Shell very slender and elongate, pale grey or white, very finely and regularly ribbed throughout, very solid, apex blunt; whorls 13–14, slightly rounded, suture well impressed; aperture oblique, rounded below, outer lip sharply edged and continued as a well developed callus upon the strong thickened columellar margin.

"Length 2·32 [59 mm.], major diam. 0·4 inch [10 mm.]." (*Godwin-Austen.*)

Hab. India: W. Khasi Hills; Nongumlai; Laudomodo (*Godwin-Austen*); Harmutti, Dafla Hills (*Godwin-Austen*).

"The species can at once be distinguished from *G. casiaca*, Bens., by its white colour and by the absence of the dark brown epidermis that covers the latter; the whorls also are much more rounded, whereas in *casiaca* they are nearly flat." (*Godwin-Austen.*)

In addition to the differentiating characters noted by Godwin-Austen, *orthoceras* has a narrower base and the costæ are finer and more crowded.

Var. **austeni**, *Pilsbry.*

Bacillum orthoceras austeni (subsp.), Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 3, pl. 1, fig. 4.

Original description :—"Shell with the grey color, deficient cuticle and convex whorls of *B. orthoceras*, but much more rapidly tapering, the last whorl being much wider; striation coarser. Spire straightly tapering, very slender above. The early whorls are broken from the type specimen, 9½ remaining. Length (broken) 53·8, diam. 12, length of aperture 12·5 mm." (*Pilsbry.*)

Hab. India: Naga Hills.

Genus **CURVELLA**, *Chaper.*

Hapalus, Albers, Die Heliceen, 1850, p. 140 (section of *Bulimus*, only species *B. grateloupi*, Pfeiffer); von Martens, Die Heliceen, ed. 2, 1860, p. 238; non *Hapalus*, Billberg, 1820 (Coleoptera).
Curvella, Chaper, Bull. Soc. Zool. France, x, 1885, p. 49; Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 46.

Type, *C. sulcata*, Chaper.

Range. India, China, Philippine Islands, West, East, and South Africa.

"Coquille regulièrement conique, mince, non ombiliquée, récouverte d'un epiderme très mince, luisant, olivâtre; de cinq à six tours de spire, peu globuleux, ornés de stries ou côtes d'accroissement, columelle droite ou courbe; ouverture à bords tranchants; bord columellaire légèrement étalé en arrière; bord externe fortement arqué en avant dans sa partie moyenne, se recourbant brusquement en sens contraire vers sa base de façon que la suture en soit fortement reporteé en arrière." (*Chaper.*)

"This genus is separated from *Opeas* by the forwardly arched outer lip, the shorter, wider contour, and usually smaller number of whorls. The columella is frequeutly sinuous. In some cases the separation from *Opeas* seems somewhat arbitrary, and the boundaries of the two groups in detail are still unsettled. The species were considered Bulimi in the older classifications, but there is no doubt that they are Achatinoid.

"Central tooth of the radula narrow, laterals tricuspid. Reproduction is by globular eggs, small and calcareous-shelled, as in the closely related group *Opeas*." (*Pilsbry.*)

309. **Curvella sikkimensis**, *Reeve.*

Bulimus sikkimensis, Reeve, Conch. Icon. v, 1850, *Bulimus*, pl. 87, fig. 651 (*juv.*); Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 436; ibid., Conch.-Cab., *Bulimus*, 1853, p. 78, pl. 21, figs. 10, 11; Benson, A. M. N. H. ser. 3, v, 1860, p. 464; Hanley & Theobald, Conch. Ind. 1870, pl. 19, fig. 7.
Bulimus (*Rhachis*) *sikkimensis*, Pfeiffer, Malak. Blätt. ii, 1856, p. 161.
Hapalus sikkimensis, Nevill, Hand List, i, 1878, p. 174.
Stenogyra (*Spiraxis* (*Nothus*)) *sikkimensis*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 324.
Curvella sikkimensis, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 66, pl. 9, figs. 59, 60.

Original description:—"Shell ovate, somewhat inflated, spire rather short, obtuse at the apex, whorls four in number, the last much the largest, concentrically finely striated, sutures impressed, columella slightly twisted, thinly reflected, aperture oblong, slightly sinuated at the upper part, pale olive, semitransparent." (*Reeve.*)

Hab. India: Darjeeling, Sikkim (*Benson, Blanford, Stoliczka, Mainwaring*).

"The shell figured in 'Conchologia Iconica' as *Bulimus sikkimensis*, Reeve, proves to be an extremely young specimen of a fine *Spiraxis*, of which an example with seven whorls, was obtained at Darjeeling by Mr. W. T. Blanford, measuring 27 mill. in length by nearly 10 in diameter." (*Benson.*)

Four specimens in the British Museum measure only 17 mm. in length, with a diameter of 6·5 mm., but these are probably immature.

310. **Curvella blanfordi**, sp. n.

Shell elongate-conoid, rather solid, finely and closely striated, dull, greenish corneous. Spire narrow conoid, with straight sides; suture shallow; apex acute. Whorls 7½, flattened, increasing rapidly, the last equalling ⅖ the entire length of the shell. Aperture elliptic-reniform, peristome thin, the margins united by a thin callus on the parietal wall; outer margin nearly vertical and straight, basal margin curved, columellar margin reflexed, much twisted.

Length 27·5, diam. 10 mm.; apert. height 11, width 4 mm.

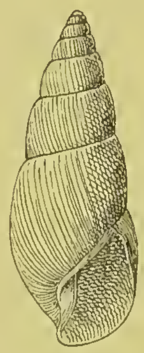

Fig. 119.—*Curvella blanfordi.* $\frac{3}{2}$.

Hab. India: Darjeeling, Sikkim (*W. T. Blanford*). Type in the British Museum.

A specimen in the British Museum, presented by the late W. T. Blanford in 1860, was labelled *Bulimus sikkimensis*, but differs from that species in the sinuous columella, the flattened whorls, and the covered umbilicus; it is besides a larger shell. It may be separated also from *Curvella munipurensis* by the more flattened whorls and the more twisted columella.

311. **Curvella scrobiculatus**, *Blanford.*

Bulimus scrobiculatus, Blanford, J. A. S. B. xxxiv, 1865, p. 77; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 151; Hanley & Theobald, Conch. Ind. 1874, pl. 79, fig. 9.

Bulimina (*Hapalus*) *scrobiculata*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 300.

Hapalus scrobiculatus, Nevill, Hand List, i, 1878, p. 175.

Original description:—"Shell subobtectly perforated, turritedly ovate, thin, horny, yellowish white, marked with vertical, subarcuate, rather irregular, closely set, raised lines. Spire turrited, apex obtuse, suture simple, impressed. Whorls 6, convex, the

last rounded beneath. Aperture vertical, truncately ovate; peristome simple, thin; right margin considerably curved forwards; columellar vertical, curving to the left near the base, frequently straight, rather broadly reflexed.

"Length 7, diam. 3½ mill., length of apert. 3½ mill." (*Blanford.*)

Hab. Burma: Pegu, west of the Irawaddy (*Blanford*).

"The nearest ally of this species is its congener *B. putus*, Bens., which inhabits the same localities, and differs in its greater tumidity and less marked sculpture. There is, however, much variation in the first named character, and despite the great difference between the two forms in general, there is some appearance of a passage. Two specimens of *B. putus* which I possess, measuring respectively 7 and 8½ millem. in length, are both 5 millem. in diameter. Both these shew a tendency to a passage to *Spiraxis*." (*Blanford.*)

I have seen two specimens in the British Museum which measure 6 mm. in length with a diameter of 3·5 mm., but they are probably immature.

312. **Curvella pusilla**, *Blanford.*

Spiraxis pusilla, Blanford, J. A. S. B. xxxiv, 1865, p. 78; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 192; Hanley & Theobald, Conch. Ind. 1874, pl. 79, fig. 8.
Hapalus pusillus, Nevill, Hand List, i, 1878, p. 174.
Stenogyra (*Spiraxis* (*Euspiraxis*)) *pusilla*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 324.
Curvella pusilla, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 64, pl. 9, fig. 48.

Original description:—"Shell imperforate, ovate, thin, horny, yellowish white, costulately striated. Spire conically pyramidal; sides straight; apex rather acute; suture impressed. Whorls 5, convex; the last longer than the spire (ratio = 4 : 3) and rounded beneath. Aperture rather oblique, subpyriform; peristome simple, acute, much curved forwards on the right margin; columella scarcely twisted, reflexed, appressed on the whorl.

"Length 6, diam. 3½, length of aperture 3½ mill." (*Blanford.*)

Hab. Burma: Prome, Pegu (*Blanford*).

"I am not quite sure if all of the few specimens I possess of this peculiar small form came from Akontoung, or whether some may not be from Thayet Myo. The shell resembles young specimens of *Bulimus putus*, Bens., so closely, that it can only be distinguished by the absence of any perforation." (*Blanford.*)

313. **Curvella puta**, *Benson.*

Bulimus putus, Benson, A. M. N. H. ser. 2, xix, 1857, p. 330; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 502; Blanford, J. A. S. B. xxxiv, 1865, p. 94; Hanley & Theobald, Conch. Ind. 1874, pl. 80, fig. 9.

Hapalus putus, Nevill, Hand List, i, 1878, p. 175.
Bulimina (*Hapalus*) *puta*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 299.
Buliminus (?) *putus*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1901, p. 689, pl. 103, fig. 23.

Original description:—"Testa perforata, ovato-acuta, tenui, striatula, sub epidermide tenui cornea albida; spira conica, apice obtusiusculo, sutura satis impressa; anfractibus 6 convexis, ultimo dimidium testæ vix superante; apertura verticali, semiovali majuscula; peristomate acuto, recto, margine columellari reflexiusculo.

"Long. 7, diam. vix 5 mill., long. apert. vix 4, diam. 2½ mill." (*Benson.*)

Hab. Burma: Tavoy (*Theobald*); Akoutoung, Thyet Myo, and Bassein District (*Blanford*).

314. Curvella plicifera, *Blanford.*

Bulimus plicifer, Blanford, J. A. S. B. xxxiv, 1865, p. 77; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 151; Hanley & Theobald, Conch. Ind. 1874, pl. 80, fig. 8.
Bulimina (*Hapalus*) *plicifera*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 300.
Buliminus (? n. s.) *plicifer*, Kobelt, Conch.-Cab., Fam. Buliminidae, 1901, p. 688, pl. 103, fig. 22.
Curvella plicifera, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 63, pl. 9, fig. 45.

Original description.—"Shell obtectly perforated, ovately conical, rather thin, horny, finely striated. Spire conical, apex obtuse; suture marginate, scarcely impressed. Whorls 5, planulately convex above, the last longer than the spire, somewhat tumid, rounded at the base. Aperture vertical, truncately oval, subpyriform; peristome simple; right margin curved forwards; columellar callous, subvertical, slightly curved, rather broadly reflexed; margins united by a callus bearing a small entering lamella about the centre.

"Length 9, diam. 5½ mill.; apert. 5 mill. high, 2½ broad." (*Blanford.*)

Hab. Burma: Thyet Myo, Pegu (*Blanford*); Prome (*Theobald*).

"A more tumid shell than *B. putus*, Bens., and easily distinguished from all other Indian and Burmese forms of the genus by the re-entering parietal plait." (*Blanford.*)

Pilsbry places it in *Curvella* with some doubt, stating that its systematic position is uncertain.

315. Curvella munipurensis, *Godwin-Austen.*

Bulimus (*Harpalus*) *munipurensis*, Godwin-Austen, P. Z. S. 1872, p. 516, pl. 30, fig. 8.
Bulimus (*Hapalus*) *munipurensis*, Hanley & Theobald, Conch. Ind. 1876, pl. 148, figs. 1, 4.

Bulimus munipurensis, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 182.

Hapalus munipurensis, Nevill, Hand List, i, 1878, p. 174.

Bulimina (Hapalus) munipurensis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 299.

Curvella munipurensis, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 65, pl. 9, figs. 51, 52.

Original description:—"Shell rimate, elongately turreted, thin, covered with a pale ochre or straw-coloured epidermis, and strongly and obliquely striated; spire turreted, apex blunt; whorls 7½, convex, suture strongly impressed; aperture oblique, rounded below, milky white inside; peristome acute, outer and upper margin arched well forward; columellar margin straight, strong, and slightly twisted forward; a thin white callus on the parietal margin. Animal pale orange, fainter tint above the head; foot short; eye-peduncles short, swollen at the base, lower tentacles very short blunt projections.

"Alt. 0·88 inch [=22·25 mm.], diam. 0·30 [=7·5 mm.]; apert. alt. 0·35 [=9 mm.], lat. 0·17 [=4·25 mm.]." (*Godwin-Austen.*)

Hab. India: Hengdan Peak, 7000 ft. On the Munipur boundary (*Godwin-Austen*).

This species is intermediate between *C. sikkimensis* and *C. khasiana*, but it has the last whorl proportionately much wider than the latter, nearly equalling half of the entire length of the shell. The shell is firmly plicate-striate and decussated. Two specimens in the British Museum measure 16 × 6·5 mm.

316. **Curvella khasiana**, *Godwin-Austen.*

Bulimus (Harpalus) khasianus, Godwin-Austen, P. Z. S. 1872, p. 516, pl. 30, fig. 7.

Bulimus (Harpalus) khasiacus, Godwin-Austen, J. A. S. B. xlv, 1876, p. 317.

Bulimus (Hapalus) khasianus, Hanley & Theobald, Conch. Ind. 1876, pl. 148, fig. 7.

Bulimus khasianus, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 183.

Hapalus khasianus, Nevill, Hand List, i, 1878, p. 174.

Bulimina (Hapalus) khasiana, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 299.

Curvella khasiana, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 65, pl. 9, figs. 53–55, 58.

Original description:—"Shell subperforate, ovately turreted or acutely ovate, thin, diaphanous, fresh specimens often glossy, becoming dull white or pale straw-colour with age; minutely striated under lens; spire conical, apex blunt, suture moderate; whorls 6–7, slightly convex, the body-whorl large and tumid; aperture vertical, semi-oval; peristome simple, sharp, rounded and arched considerably forward at the upper angle; the columella is curved forward from behind, and the margin slightly reflected.

"Alt. 0·59 inch [=14·75 mm.], diam. 0·28 [=7 mm.], apert. diam. 0·16 [=4 mm.], alt. 0·29 [=7·25 mm.]. Large sp.

"Alt. 0·41 inch [=10·5 mm.], diam. 0·20 [=5 mm.], apert. diam. 0·12 [=3 mm.], alt. 0·23 [=6 mm.].

"Animal with a short foot, pointed behind, pale yellow tint; eye-tentacles dark to the base, lower very short." (*Godwin-Austen.*)

Hab. India: Khasi, Jaintia, and Naga Hills (*Godwin-Austen*); Dikrang Valley, Dafla Hills, 2500 ft. (*Godwin-Austen*); Naga Hills (*Roberts*); Darjeeling, Sikkim (*Stoliczka*).

"It appears to be very close to *Bul. putus*, Bens., from Tavoy. Specimens differ very much in size from different collections. The shell is very finely developed in the high parts of the North Cachar Hills at 6000–7000 feet (fig. 7). At Cherra Poonjee it assumes a more tumid form (fig. 7 *a*), and it is very frequently dwarfed to the length of only 0·36 inch [=9 mm.], especially in its lower habitats; but these variations are not of sufficient specific importance." (*Godwin-Austen.*)

Jousseaume expressed the opinion* that *C. khasianus* and *C. munipurensis* are identical in form. A glance at the figures will convince anyone that this suggestion is not borne out by facts.

The British Museum possesses four specimens from the Khasi Hills, measuring 12 × 5·5 mm.

Genus **OPEAS**, *Albers.*

Opeas, Albers, Die Heliceen, 1850, p. 175 (as subgenus of *Bulimus*), first species *Bulimus subula*, Pfeiffer; Martens, Die Heliceen, ed. 2, 1860, p. 265 (as subgenus of *Stenogyra*), type *Helix goodalii*, Miller; Crosse & Fischer, Miss. Scient. Mexique, Moll. i, 1877, p. 592; Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 122.

Type, *Bulimus subula*, Pfeiffer.

Range. Throughout tropical and subtropical regions, except Australia.

"Shell small, thin, turrite, usually perforate, with large, obtuse, rounded apex and convex or flattened whorls, corneous or yellowish. Embryonic whorls smooth. Aperture small, ovate, the outer lip thin, usually arched forward, columella straight or concave, not sinuous, the columellar lip reflexed, curving into the basal lip and not toothed or truncate below. Oviparous, the egg-capsules large and spheroidal.

"*Opeas* contains small, thin, oviparous stenogyrine snails with the apex large, obtuse, rounded and smooth, and the columellar margin reflexed, rounded below, or at least not distinctly truncate. The species are spread throughout tropical and subtropical regions, but as yet none is known from Australia. A few species colonize freely, and have spread wherever commerce reaches in suitable climates. Others, restricted to special stations not to be

* Bull. Soc. Zool. France, x, 1885, p. xxii.

found in cultivated areas, are as local as most other land snails. Owing to the similarity of the shells, their determination is difficult, and demands the greatest application.

"*Opeas* stands very close to the groups *Prosopeas* and *Curvella*. The former differs by merely such minor features as the rougher, often minutely lamellose sculpture, the greater size and flatter whorls, but these give the shell a rather different aspect. *Curvella* in its typical form differs by the short and Bulimoid shape; but some of the species are arbitrarily referred to one or the other genus. The distinction between *Opeas* and *Curvella* is by no means convincing; yet even small differences have significance which may usefully be recognized in dealing with large groups of similar species.

"*Opeas* and *Subulina* begin to reproduce before the shell has attained its full size, usually when it is about two-thirds grown.

"In many species two forms co-exist in the same colony, a more slender and a stouter; all other features remaining the same. Intermediate contours usually occur if a large gathering is at hand. This dimorphism must be kept in mind, especially when dealing with small sets.

"Excepting a few forms spread by commerce or other means, the Old and New World species are distinct. Most of the Eastern forms belong to typical *Opeas*.

"Several species in each hemisphere have been enabled, by their hardiness and adaptability to life in cultivated areas, to colonize over a large part of the tropical and subtropical zones. There cannot be much doubt that the carriage of living plants from place to place has been a chief factor in the dispersal of *Opeas* . . . . and other snails as well. The habits of these forms are such that they find practically the same environment anywhere in zones of similar temperature, and their spread from new centres is often very rapid. *Opeas gracile* is probably the most widely distributed land snail in the world." (*Pilsbry.*)

I have quoted at some length from the admirable account of this difficult genus by Professor Pilsbry, which sets forth all the known facts in an extremely lucid fashion. His observations with regard to dimorphism—to which he is, I believe, the first to draw attention—are particularly valuable, and should be borne in mind by every conchologist when about to describe supposed new species.

317. **Opeas gracile**, *Hutton*.

No. 5, *Bulimus?*, Hutton, J. A. S. B. iii, 1834, p. 84; No. 5, *Bulimus?* (*mihi*) *gracilis?*, ibid., tom. cit. p. 93; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 157; Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 69, fig. 495; Blanford, J. A. S. B. xxxiv, 1865, p. 94; Pfeiffer, Conch.-Cab., *Bulimus*, 1853, p. 79, pl. 21, figs. 18, 19; Hanley & Theobald, Conch. Ind. 1870, pl. 23, fig. 4; Godwin-Austen, J. A. S. B. xlv, 1876, p. 317.

Bulimus (Opeas) gracilis, Pfeiffer, Malak. Blätt. ii, 1856, p. 156.
Stenogyra (Opeas) gracilis, von Martens, Die Heliceen, ed. 2, 1860, p. 265; Nevill, J. A. S. B. xlvi, 1877, p. 25; ibid., Hand List, i, 1878, p. 164; ibid., Zool. Res. Exp. W. Yunnan, i, 1879, p. 885; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 321.
Spiraxis gracilis, Blanford, J. A. S. B. xxx, 1861, p. 362.
Stenogyra gracilis, von Martens, Preuss. Exp. Ost-Asien, Zool. Theil, ii, 1867, p. 375, pl. 19, fig. 5, pl. 22, fig. 13; Westerlund, Vega Exp. Vetensk. Jakt. iv, 1887, p. 187; Peile, Journ. Bombay Nat. Hist. Soc. xi, 1908, p. 131.
Opeas gracilis, Theobald, J. A. S. B. xlvii, 1878, p. 146; Godwin-Austen, P. Z. S. 1895, p. 443; Collett, J. A. S. Ceylon, xv, 1898, p. 17; Smith, Fauna and Geogr. Maldive & Laccadive Arch. i, part 2, 1902, p. 141.
Opeas gracile, Möllendorff, P. Z. S. 1894, p. 151; Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 125, pl. 18, figs. 3–6.
Bulimus indicus, Pfeiffer, P. Z. S. 1846, p. 40; ibid., Mon. Helic. Viv. ii, 1848, p. 157.
Opeas indicus, Dautzenberg & Fischer, Journ. Conchyl. liii, 1905, p. 102.
Opeas apex, Mousson, var. *nicobarica*, Mörch, Journ. Conchyl. 1872, p. 313.

Original description:—"Shell transparent, thin and pale coloured or rather colourless; spire gradually tapering; whorls 12, body-whorl equal to the two preceding ones; length 6½ lines*. Aperture longer than broad, semi-ovate; pillar-lip straight and slightly reflected; right lip edged." (*Hutton.*)

Hab. India: Mirzapore (*Hutton*); Calcutta, Rajmehal, Chandipal, Patna (*Nevill, Mainwaring*); Erode, Poona, Bombay (*Blanford, Fairbank*); Bombay Island (*Peile*); Assam (*Stoliczka*); Khasi Hills (*Adams*); Dafla Hills (*Godwin-Austen*); Madras (*Blanford*); Kashmir (*Theobald*); Naini Tal, Salt Range, Roorkee (*Stoliczka*). Burma: Zwagabin, Arakan, Rangoon, Moulmain (*Stoliczka, Theobald*); Tsagain, Bhamo (*Anderson*); Ava, Pegu, Arakan, Moulmain (*Blanford*). Ceylon: Point de Galle (*Martens, Vega Exped.*); Ambagamuwa (*Collett*). Andaman Group (*Stoliczka, Nevill*); Port Blair (*Godwin-Austen*). Nicobar Group: Teressa (*Godwin-Austen*); Nancoury (*Mörch*). Laccadive Islands (*Stanley Gardiner*). Samui Islands (*Möllendorff*).

In addition to the foregoing localities within the Indian region, the species has been recorded from China, Formosa, and Japan, the Malay Archipelago, the Mascarenes, and Polynesia. The bibliography here quoted is limited to its bearing on the Indian Fauna, and I have omitted all references to its occurrence outside the Indian region. The bibliography, including varieties, contained in the Manual of Conchology, comprises upwards of two whole pages. Pilsbry includes *O. subula*, Pfeiffer, under its synonymy, but the identity of the two forms I do not consider has been established, and I prefer to confine the designation of *O. gracile*

* I have only one of this length, the generality being about 5 lines. It has also 12 whorls, while the others have about 9 or 10.

to the Old World form, retaining *O. subula* for the American shells.

The British Museum possesses specimens received from Hutton who collected them at Mirzapore; these measure 13·5 × 3·5 mm. My own collection contains specimens composed of nine whorls and measuring 13 mm. in length. One of these contained four spherical calcareous eggs 0·75 in diameter. Major Peile has collected the species at Bassein and Bombay Island, some of the latter having the periostracum in a beautiful fresh state, a rather rare occurrence.

Var. panayensis, *Pfeiffer*.

Bulimus panayensis, Pfeiffer, P. Z. S. 1846, p. 33; ibid., Mon. Helic. Viv. ii, 1848, p. 156.

Stenogyra panayensis, von Martens, Preuss. Exp. Ost-Asien, Zool. Theil, ii, 1867, pp. 83, 376, pl. 22, fig. 8; Tapparone Canefri, Ann. Mus. Civ. Genova, xix, 1883, p. 87; ib., xx, 1884, p. 144; Semper, Reisen Arch. Philipp. 2te Teil, iii, 1885, p. 137, pl. 8, fig. 15 (shell), pl. 11, fig. 17 (anat.), fig. 21 (dentition); Westerlund, Vega Exped. Vetensk. Jakt. iv, 1887, p. 187; Hidalgo, Journ. Conchyl. xxxvi, 1888, p. 34; Fischer & Dautzenberg, Mission Pavie, iii, 1904, p. 411.

Stenogyra (Opeas) panayensis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 321; von Martens in Max Weber, Zool. Ergebn. Reise Niederl. Ost-Indien, ii, 1891, p. 243.

Opeas gracile, var. *panayensis*, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 131, pl. 18, figs. 1, 2.

Original description:—"Bul. testa imperforata, subulata, tenui, lævigata, pellucida, cereo-hyalina; spira elongata, apice obtuso; anfractibus 8, latis, vix convexiusculis, ultimo ¼ longitudinis vix æquante, columella brevi, strictiuscula; apertura ovali-oblonga, basi subangulata; peristomate simplice, recto, margine columellari breviter reflexo, appresso.

"Long. 11, diam. 2½ mill." (*Pfeiffer*.)

Hab. Ceylon: Point de Galle (*Westerlund*).

Said to have a general distribution from Indo-China to the Moluccas and Aru Islands. Collected in Ceylon by the Vega Expedition.

Var. cereus, *Reeve*.

Bulimus cereus, Reeve, Conch. Icon. v, *Bulimus*, 1849, sp. 501, *Achatina*, pl. 17, fig. 81.

Bulimus gracilis, var. ? *cereus*, Pfeiffer, Mon. Helic. Viv. 1853, p. 399.

Stenogyra (Opeas) gracilis, var. *cereus*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 321.

Opeas gracile, var. *cereus*, Pilsbry, Man. Conch. ser. 2, xviii, 1906, pp. 127, 128, pl. 18, fig. 7.

Original description:—"Shell subulate, umbilicated, thin, whorls

ten in number, convex, arcuately concentrically striated, columella reflected, aperture small, lip simple; transparent straw-colour.

"Whorls appear more convex than in *B. gracilis*." (*Reeve.*)

Hab. India: Moradabad.

318. **Opeas prestoni**, *Sykes.*

Opeas prestoni, Sykes, Proc. Malac. Soc. London, iii, 1898, p. 73 pl. 5, fig. 4.
Opeas mauritianum, var. *prestoni*, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 134, pl. 17, figs. 98–100.

Original description:—"T. subperforata, elongato-cylindrica, translucida, tenuis, cornea vel cereo-cornea, apice obtusiusculo; anfr. $8\frac{1}{2}$, plano-convexi, longitudinaliter lineis incrementibus striati, ultimus $\frac{9}{20}$ longitudinis subæquans, sutura bene impressa, apertura elongato-ovata; peristoma simplex, acutum, margine columellari ad basim breviter reflexo, perforationem fere tegente.

"Alt. 11, diam. 3·25 mm., alt. ap. 3, lat. ap. 1·8 mm." (*Sykes.*)

Hab. Ceylon: Uda Pussellawa (*Preston*).

"The apex is much more obtuse and the earlier whorls are broader than *O. gracilis*, and the shell generally is more cylindrical and not so needle-shaped; it appears to be variable in colour. I have given the dimensions of an average specimen; one found by Mr. Preston measures alt. 14, diam. 4 mm." (*Sykes.*)

319. **Opeas innocens**, *Preston.*

Opeas innocens, Preston, Rec. Indian Mus. v, 1910, p. 33, fig. 2.

Original description:—"Shell bluntly subulate, whitish, thin; whorls 8, flat, rather sharply shouldered above and below, transversely striate with lines of growth; sutures deeply impressed; columella descending in a slight curve, extending above into a thick, parietal callus which joins the margin of the lip above; labrum acute, simple, aperture elongately ovate.

"Altitude 5·5, diam. major 1·25, apert. alt. ·75, diam. ·25 mm." (*Preston.*)

Hab. Burma: Khayon Cave, near Moulmain (*Annandale*).

Appears to be closely related to, if not identical with, *O. gracile.*

320. **Opeas latebricola**, *Reeve.*

Bulimus latebricola (Benson), Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 80, fig. 572; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 401; ibid., Conch.-Cab., *Bulimus*, 1853, p. 74, pl. 20, figs. 5, 6; Hanley & Theobald, Conch. Ind. 1874, pl. 79, fig. 7.
Bulimus (*Opeas*) *latebricola*, Pfeiffer, Malak. Blätt. ii, 1856, p. 156.
Stenogyra (?) *latebricola*, Nevill, Hand List, i. 1878, p. 174.
Buliminа (*Hapalus*) *latebricola*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 299.
Opeas latebricola, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 162, pl. 19, figs. 20, 23.

Original description :—"Shell acuminately oblong, compressly umbilicated, whorls six in number, somewhat rounded, smooth, or concentrically striated; transparent straw-colour, polished. A very delicately coloured, transparent species." (*Reeve.*)

Hab. India: Landour, Western Himalayas (*Benson*); Darjeeling (*Blanford, Stoliczka, Mainwaring*); Khasi and Dafla Hills (*Godwin-Austen*).

The above cursory description is supplemented by Pfeiffer as follows:—

"T. subperforata, turrito-oblonga, tenuicula, striatula, vix nitidula, diaphana, albido-straminea; spira turrita, apice obtusiuscula; anfr. 6–6½ vix convexi, ultimus ⅓ longitudinis paulo superans, basi rotundatus; columella substricta, verticalis, oblonga; perist. simplex, rectum, marginibus subparallelis, columellari anguste reflexo.

"Long. 7⅓, diam. 3 mill. Ap. 2⅔ mill. longa, 1⅔ lata." (*Pfeiffer.*)

The British Museum possesses five specimens from Landour, received from the Indian Museum, which are smooth and polished, and very finely striated, while the columella has a slight, revolving plait, to which neither Reeve nor Pfeiffer makes any reference. These specimens only measure 5·5 mm. in length, whereas the shell figured by Reeve has an indicated length of 7 mm. Prof. Pilsbry considers the species related to *O. layardi*, but the latter has the outer margin of the peristome inflected, a feature lacking in *O. latebricola.*

321. **Opeas mariæ**, *Jousseaume.*

Opeas mariæ, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 290, pl. 4, fig. 9; Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 159, pl. 4, fig. 9.

Original description :—"Testa subperforata, elongato-turrita, solidula, opaca, arcuatim striata, alba, epiteste flavido-alba, vix nitens, spira elongata, apice obtusa, sutura immersa, crenulata; anfr. 8, convexiusculi, ultimus $\frac{4}{9}$ longitudinem æquans; apertura oblongo-ovalis, superne oblique truncata; perist. simplex acutum; margine dextro superne depresso, fere recto, columellari ad suturam late dilatato-reflexo, perforationis partem formante.

"Long. 9 mill.; diam. 2 mill." (*Jousseaume.*)

Hab. Ceylon: Kandy (*Simon*).

Mr. Sykes suggests (Proc. Malac. Soc. London, iii, 1898, p. 73) that it is "suspiciously near" to *O. gracile*, but Jousseaume's figures do not bear out this contention, as the whorls are much more flattened and proportionately higher, while the outer lip of the peristome is considerably more straightened.

322. **Opeas nevilli**, *Godwin-Austen.*

Opeas nevilli, Godwin-Austen, J. A. S. B. xlv, 1876, p. 315, pl. 8, fig. 12.
Stenogyra (*Opeas*) *nevilli*, "G. Ad.", Nevill, Hand List, i, 1878, p. 165.

Original description:—"Shell turreted, very elongate, pale, silky with a green tinge, older specimens of a pale straw-colour, covered with a thin epidermis, beautifully striate under lens. Whorls 11–12, moderately rounded and very gradually diminishing in size to the apex, which is blunt; suture impressed; aperture angular above, outer lip thin.

"Alt. 0·55″ [=14 mm.], major diam. 0·10″ [=2·5 mm.]. Largest specimen 0·90″ [=23 mm.]." (*Godwin-Austen.*)

Hab. India: Dafla Hills, Assam (*Godwin-Austen*).

"This very delicate elongate shell was common on Toruputu Peak, but far finer specimens, equal in size to the figure, were obtained on the banks of the Pichola Nulla out in the plains. I am not satisfied with this figure; the whorls being rather too flat and the apex too sharp." (*Godwin-Austen.*)

Prof. Pilsbry (Man. Conch. ser. 2, xviii, 1906, p. 157) states, "Nevill in his Hand List Ind. Mus. i, p. 165, lists *Stenogyra* (*Opeas*) *nevilli*, G. Ad., from the Dafla Hills. It is undescribed and unknown to me." The "G. Ad." in Nevill's Hand List is evidently a printer's error for "G.-A." and this probably put Pilsbry off the track.

323. **Opeas layardi**, *Benson.*

Spiraxis layardi, Benson, A. M. N. H. ser. 3, xi, 1863, p. 90; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 190; Hanley & Theobald, Conch. Ind. 1874, pl. 79, figs, 2, 3.
Stenogyra (?) *layardi*, Nevill, Hand List, i, 1878, p. 174.
Stenogyra (*Spiraxis* (*Euspiraxis*)) *layardi*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 323.
Euspiraxis layardi, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 291.
Opeas layardi, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 158, pl. 4, figs. 19, 20; pl. 16, figs. 82, 83.
Opeas (*Tomopeas*) *layardi*, Pilsbry, l. c. p. 123.

Original description:—"S. testa imperforata, elongato-turrita, tenui, arcuato-striatula, albida, epidermide tenui polita cornea induta; spira elongata, apice obtuso, sutura profundiuscula, nonnunquam eroso-dentata; anfractibus 7½, convexis, ultimo pone columellam impresso; apertura oblonga, elongato-ovata, superne angustata; peristomate tenui, acuto; labro arcuato, margine columellari incrassato, modice torto.

"Long. 12½, diam. 4 mill.; ap. long. 4, diam. vix 2 mill." (*Benson.*)

Hab. Ceylon: Moopana, Badulla, Kandookare (*Layard*); Caltura (*Nevill*).

The species is referred to *Opeas* by Pilsbry with some doubt, who considers that "the subtruncate, calloused columella recalls *Tortaxis*, yet the delicacy of the shell, its small apex, and the oviparous reproduction, are characters of *Opeas*. It is probably related to *O. avenacea*, Morel., *javanicum*, Rve., etc., which have the columella similarly truncate."

I have only seen one specimen, which is in the British Museum. It is from Kandy and measures: length 16·5 mm., diam. 4·25 mm.

324. Opeas sykesi, *Pilsbry*.

Opeas sykesi, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 157, pl. 21, figs. 1, 2.

Original description:—"Shell perforate, resembling *O. gracile* in sculpture, but with the *whorls much shorter*, more compactly coiled, more numerous in shells of the same length. Spire straightly and regularly tapering to the small apex. Whorls $8\frac{1}{2}$ to 10, the embryonic $1\frac{1}{2}$ smooth except for a minute subsutural radial striation, which becoming stronger on the post-embryonic whorls, produce a fine, irregularly developed crenulation of the suture, the latter becoming smooth again lower down. Later whorls somewhat flattened. Suture well impressed. Aperture vertical, *much shorter than in O. gracile*; outer lip weakly arcuate, a little arched forward; basal margin well arched; columella rather straightened, the edge reflexed.

"Length 11, diam. 3·4, aperture 2·9 mm.; whorls $8\frac{1}{2}$.

"Length 12·9, diam. 3·5, aperture 3·1; whorls 10." (*Pilsbry.*)

Hab. Ceylon.

"This form is readily selected from among *O. gracile* by its short whorls and small, wider mouth, with a deep bay where the columella joins the parietal wall. I do not see, in the great number of *O. gracile* before me, any approach to this form." (*Pilsbry.*)

325. Opeas ? pusillus, *H. Adams*.

Bulimulus (*Ena*) *pusillus*, H. Adams, P. Z. S. 1867, p. 307, pl. 19, fig. 17.

Stenogyra pusillus, Nevill, Enum. Helic. Ceylon, 1871, p. 3.

Bulimus (*Bulimulus*) *pusillus*, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 186.

Bulimulus (*Leptomerus*) *pusillus*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 234.

Ena pusilla, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 297.

Original description:—"B. testa sinistrorsa, rimato-perforata, cylindrico-turrita, tenui, inæqualiter striata, vix nitidula, olivaceo-fusca; spira elongata, sursum parum attenuata, apice obtusiuscula, sutura distincta; anfr. 7, convexiusculis, ultimo $\frac{1}{3}$ longitudinis vix

æquante, basi rotundato; apertura verticali, semiovali; perist. recto, margine columellari subverticali, superne dilatato, patente.

"Long. 5, diam. 2 mill." (*H. Adams.*)

Hab. Ceylon; Matelle (*F. Layard*).

Fig. 120.—*Opeas? pusillus.* (Enlarged.)
(From P. Z. S.)

"Peculiar from being, at least so far as I know, the only sinistral land-shell that has yet been met with in the island." (*H. Adams.*)

Referred with some doubt to *Opeas*; it certainly has nothing to do with *Ena*. It may possibly be a monstrosity. I give a copy of Adams's figure.

Genus **PROSOPEAS**, *Mörch.*

Prosopeas, Mörch, Journ. Conchyl. 1876, p. 358, as section of *Bulimus* for *B. roepstorfi*, Mörch, and *B. achates*, Mörch (no description); Pilsbry, Man. Conch. ser, 2, xviii, 1906, p. 14.

Type, *Bulimus roepstorffi*, Mörch.

Range. Farther India, including Malay Peninsula, Andaman and Nicobar Islands, China, Malay Archipelago, Philippine Islands.

"Shell Stenogyroid, of moderate or large size, imperforate or nearly so, with rather small, semiglobose apex, the first two whorls typically smooth (but ribbed in the s. g. *Paropeas*), later whorls very *densely sculptured with fine oblique striæ which are arched forward above* and retracted to the suture. Aperture ovate; columella straight or concave, continuous with the basal margin below, slightly or not folded above, with a reflexed, adnate margin. Axis slender, straight or nearly so. Reproduction by globular, calcareous-shelled eggs, as in *Opeas.*

326. **Prosopeas hebes**, *Blanford.*

Spiraxis hebes, Blanford, J. A. S. B. xxx, 1861, p. 361, pl. 1, fig. 15; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 190; Hanley & Theobald, Conch. Ind. 1874, pl. 79, fig. 10.

Stenogyra (*Opeas*) *hebes*, Nevill, Hand List, i, 1878, p. 166.

Stenogyra (*Spiraxis* (*Euspiraxis*)) *hebes*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 323.

Prosopeas hebes, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 32, pl. 12, fig. 6.

Original description:—"Testa imperforata, turrita, cornea, rugoso-

striata; spira subulata, apice perobtusa, sutura albido-marginata. Anfr. 7 parum convexi, ultimus ⅓ longitudinis subæquans, basi rotundatus. Columella parum callosa, vix subtorta, brevis. Apertura fere verticalis, elongato ovalis; peristoma simplex, rectum, margine dextro superne arcuato.

"Long. 15, diam. 4 mm.; ap. 4½ alta, 2 lata." (*Blanford.*)

Hab. India: Nilgiris.

"The above are the dimensions of the largest specimen found. It is, however, possible that this shell may attain a greater size. The sole Indian species to which it appears to be related is *Sp.* (*Bul.*) *gracilis*, Hutt., from which, however, it may be easily distinguished by its very obtuse apex, less numerous whorls, etc." (*Blanford.*)

327. Prosopeas terebrale, *Theobald.*

Stenogyra (*Opeas*) *terebralis*, Theobald, J. A. S. B. xxxix, 1871, p. 401; Nevill, Hand List, i, 1878, p. 166; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 321.

Bulimus (*Stenogyra*) *terebralis*, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 133.

Prosopeas terebrale, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 31.

Original description:—"Testa elongata, imperforata, tenui, cornea, non polita, anfractibus 10½, depresse convexis, sutura impressa junctis, confertim striatis; ultimo tertiam longitudinis vix æquante, epidermide scabra; perist. acuto, margine columellari brevissime reflexo, leviter torto.

"Long. testæ ·95 [=24 mm.]; lat. max. ·17 [=4·5 mm.], alt. aperturæ ·22 unc." [=5·75 mm.]. (*Theobald.*)

Hab. Burma: Shan States (*Fedden*).

328. Prosopeas walkeri, *Benson.*

Spiraxis walkeri, Benson, A. M. N. H. ser. 3, xi, 1863, p. 90; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 189; Hanley & Theobald, Conch. Ind. 1874, pl. 79, fig. 4.

Opeas walkeri, Theobald, J. A. S. B. xxxix, 1871, p. 395; Godwin-Austen, P. Z. S. 1895, p. 443; Blanford, Proc. Malac. Soc. London, v, 1903, p. 280.

Stenogyra (*Opeas*) *walkeri*, Nevill, Hand List, i, 1878, p. 165.

Stenogyra (*Spiraxis* (*Euspiraxis*)) *walkeri*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 323.

Prosopeas walkeri, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 29, pl. 6, fig. 70.

Original description:—"S. testa, imperforata, cylindraceo-turrita, arcuato-striatissima, sub epidermide albida, spira gracili, apice obtuso, sutura profundiuscula; anfractibus 9, convexiusculis; apertura obliqua, elliptica; margine dextro tenui, acuto, superne arcuato, columellari calloso, subito revoluto.

"Long. 14, diam. 3½ mill." (*Benson.*)

Hab. Andaman Islands: Port Blair (*Haughton*); Cocos Island, Andaman Island (*Stoliczka*). Burma: Shan States (*Fedden*). Siam: Lampun (*Daly*).

Some specimens from Port Blair, presented by R. MacAndrew to the British Museum, are smaller than the type, for, although possessing nine whorls, they measure only 12×3 mm.

329. **Prosopeas pealei,** *Tryon.*

Opeas (Bulimus) pealei, Tryon, Amer. Journ. Conch. v, 1869, p. 110, pl. 10, fig. 5.
Bulimus pealei, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 128.
Stenogyra (Spiraxis (Euspiraxis)) pealei, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 323.
Prosopeas pealei, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 29, pl. 6, figs. 80, 81.

Original description:—"Shell turreted elongate, slender, rather solid; whorls eight, flatly convex, suture slight; apex papillary; aperture ovate, small; lip simple; columella perpendicular, forming an angle with the lip at the base. Light greenish horn-color, white within.

"Length 35, diam. 9 mill." (*Tryon.*)

Hab. Andaman Islands.

"Resembles *Bulimus elongatulus*, Pfr., but may be distinguished from it by the whorls being less convex and the columella straight instead of incurved." (*Tryon.*)

The type-specimen is figured by Pilsbry, who states that it differs from *P. haughtoni*, Bens., to which it has been referred as a synonym, by the non-sinuous columella, which does not form an angle with the parietal wall, by the narrower mouth, more numerous whorls and slenderer shape. He further compares it with the var. *oxynter* of Benson, which, while nearly as slender as *pealei*, differs by having the columella at an angle with the parietal wall.

330. **Prosopeas haughtoni,** *Benson.*

Spiraxis haughtoni, Benson, A. M. N. H. ser. 3, xi, 1863, p. 90; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 189; Hanley & Theobald, Conch. Ind. 1870, pl. 19, fig. 1.
Stenogyra (Prosopeas) haughtoni, Nevill, Hand List, i, 1878, p. 173; Godwin-Austen, P. Z. S. 1895, p. 443.
Stenogyra (Spiraxis (Euspiraxis)) haughtoni, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 323.
Prosopeas haughtoni, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 28, pl. 6, figs. 76, 78, 79.

Original description:—"S. testa imperforata, oblongo-conica, subturrita, solida, striata, versus suturam et apicem costulato-striata, albida, epidermide olivacea minutissime corrugata induta; spira elongato-conica, versus apicem obtusiusculum subito attenuata, sutura impressa; anfractibus 7, vix convexiusculis, sub-

planulatus, ultimo ad peripheriam subangulato; apertura vix obliqua, ovato-elliptica, intus cœruleo-albida, margine dextro tenui, acuto, columellari calloso, planato, expansiusculo, versus basin leviter emarginato, marginibus callo tenui expanso junctis.

"Long. 20–30, diam. 10–11 mill.; ap. long. 11, lat. 5 mill." (*Benson.*)

Hab. Andaman Islands: Port Blair (*Haughton*); Andaman Island (*Stoliczka*, *Roepstorff*, *Nevill*).

"Two typical examples of this species before me measure: length 27, diam. 10·7, length of aperture 10·5 mm., and 28, 11, 10·7 mm., both having a trifle over seven whorls. They are solid, strong shells, nearly denuded of the thin, olivaceous-yellow cuticle. The columella is distinctly sigmoid, and the parietal callus arising from it is wholly appressed at the edge, not raised seam-like as in *P. pealei*." (*Pilsbry.*)

Var. **oxynter**, *Benson*, A. M. N. H. ser. 3, xi, 1863, p. 90; Hanley & Theobald, Conch. Ind. 1874, pl. 79, fig. 5 (var. unnamed); Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 28, pl. 6, figs. 77, 82–84.

"Testa elongato-turrita, graciliore. Long. 30, diam. 8 mill. There is a tendency in the stouter form to verge towards the variety which I have called *oxynter*, although the extreme specimens might be considered as separate species." (*Benson.*)

Hab. Andaman Islands: Port Blair (*Haughton*).

Two specimens referable to this form are figured by Pilsbry. He states that "the cuticle is dark olive. They differ from *P. pealei* chiefly in the shape and direction of the columellar margin, which is less sinuous than in *P. haughtoni*. Length 34, diam. 10, length of aperture 10 mm.; whorls 8½."

331. **Prosopeas achates**, *Mörch.*

Bulimus (*Prosopeas*) *achates*, Mörch, Journ. Conchyl. 1875, p. 359.
Stenogyra (*Prosopeas*) *achates*, Nevill, Hand List, i, 1878, p. 173.
Stenogyra (*Opeas*) *achates*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 320.
Prosopeas achates, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 27, pl. 12, figs. 4, 5.

Original description:—"Differt a præcedente [*B.* (*Pr.*) *roepstorfi*] testa minore, abbreviata, obtecte perforata.

"Long. 14 mill.; lat. 5; long. ap. circ. 6." (*Mörch.*)

Hab. Nicobar Islands (*Stoliczka*); Kamorta, Nancouri (*Roepstorff*); Kamorta, Katchal, var. β (*Roepstorff*); Nancouri, var. γ (*Roepstorff*).

Mörch quotes *Stenogyra achatinacea*, Pfeiffer, as a synonym, without, as Prof. Pilsbry aptly says, explanation of so irregular a course. The latter figures a Nicobar shell which he considers to be referable to Mörch's form. "It is rather obese below, sub-

regularly tapering to the obtuse, smooth apex, sculptured with narrow, spaced, thread-like riblets which curve forwards above the periphery and are much weaker below it. Whorls slightly more than seven, moderately convex. The aperture is long, the outer lip arched forward above, and the columella reflexed narrowly, leaving a narrow umbilical fissure. Length 13·3, diam. 4·5, length of aperture 5·5 mm.

"This form seems to differ from *P. achatinaceum* by its larger aperture." (*Pilsbry.*)

Nevill also was of opinion that it differed from the latter (Hand List, i, 1878, p. 173).

Mörch records a variety β from Kamorta, Katchal, as smaller, rather smooth, length 11, width 9, length of aperture 5 mm., and a var. γ, from Nancouri, as rather solid, length 13, width $4\frac{1}{8}$, length of aperture 4 mm.

332. **Prosopeas roepstorffi**, *Mörch* (em.).

Bulimus (*Prosopeas*) *roepstorfi*, Mörch, Journ. Conchyl. 1876, p. 358.
Stenogyra (*Prosopeas*) *roepstorffi*, Nevill, Hand List, i, 1878, p. 173.
Stenogyra (*Opeas*) *röpstorfi*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 320.
Prosopeas roepstorfi, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 27, pl. 3, figs. 97–99.

Original description:—"*Stenogyra elongatula*, "Pfr.," Martens, l. c. [Preuss. Exp. Ost-Asien, Zool., ii, 1867] p. 379, t. 22, f. 12, affinis, sed differt: T. straminea, costulato-striata, suturis profundis; apertura dilatata, fere ficiformi, faucibus albis, columella torta, imperforata.

"Long. $22\frac{1}{2}$ millim., diam. 6; long. apert. $7\frac{1}{2}$." (*Mörch.*)

Hab. Nicobar Islands (*Stoliczka*); Kamorta (*Roepstorff*); Little Coco Island (*Wood-Mason*).

The species remained unillustrated until Prof. Pilsbry figured a specimen. It contains "nearly 8 whorls, the first globose and smooth, the rest moderately convex and sculptured with forwardly arcuate, thread-like striæ. The aperture is quite oblique, long and narrow, the thin outer lip arched forward, the columellar lip narrowly reflexed above and imperfectly appressed. The columella is concave, slightly folded at the upper insertion. Length 16, diam, 4·7, length of aperture 5·2 mm."

Genus ZOOTECUS, *Westerlund.*

Zootecus, Westerlund, Fauna Paläarct. Binnenconchyl. iii, 1887, pp. 3, 75; Martens, Arch. Naturg. lxi, 1895, 1, p. 103, pl. 8, figs. 5, 6 (jaw and radula, *Stenogyra insularis*), figs. 7, 8 (*St. pulla*); Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 104.
Chilogymnus, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 289.

"Shell rather small, pale or white, perforate, *pupiform*, cylindric

with conic summit or cylindric tapering, composed of 7 to 10 *compactly* coiled whorls, the last rounded below; striate or decussate, glossy. *Summit conic*, entire, the *protoconch* striate like the following whorls, not bulbous. Axis slender and straight, narrowly perforated throughout. Aperture small, widely ovate, the *peristome thickened*, blunt, columellar margin straight or concave, with reflexed edge, continuous with the basal lip. *Reproduction viviparous.* Dentition Achatinoid." (*Pilsbry.*)

TYPE, *Pupa insularis.*

Range. Cape Verd Isles and the Sahara eastward to Arabia, India, and Burma, chiefly in arid or barren regions.

"A group of small, Pupiform snails, largely eremitic in habits, generally occurring in large numbers, and varying within wide limits in size and degree of taper. Most gatherings from one place show shorter and longer individuals, as in *Holospira* and *Cerion*; the diameter remaining more constant for any one colony. The proportion of diameter to length is therefore individually variable. There is a good deal of local variation in size and texture, and hence a superabundance of names.

"The group was instituted by Westerlund as a section of *Buliminus*. Kobelt, in his great monograph of the *Buliminidæ*, also leaves *Zootecus* therein, though uncertain as to its position. Bourguignat struck nearer the mark in referring the species to *Rumina*, for I find the dentition to be of the Stenogyroid type. It is, however, not closely related to *Rumina*, which differs markedly by its smooth, globose protoconch and attenuated, cylindric, subsequent neanic whorls. *Riebeckia* is perhaps the nearest akin to *Zootecus*. *Opeas* and its brood belong to another line of differentiation.

"Captain Hutton found the large Indian form (*pullus*) to be viviparous, three or four young shells lying in the oviduct. I have confirmed this by opening dry shells of *Z. insularis.* The young are ovate-conic, perforate, of two or three whorls, and like the adults have the columella entire below.

"There seems to be only two well-marked species, but *Z. insularis* has a multitude of local races." (*Pilsbry.*)

Von Martens figured and described the jaw and radula of *Zootecus insularis* and *Z. pullus*, attributing them to the genus *Stenogyra*. He observes, moreover, that the name *Zootecus* should be spelled *Zootocus*, but this procedure is inadvisable as the name would in that case clash with *Zootoca*, Wagler, 1830 (Reptilia), and I prefer, therefore, to adopt Westerlund's mode of spelling, as Pilsbry has done.

333. **Zootecus insularis**, *Ehrenberg.*

Pupa insularis, Ehrenberg, Symb. Phys. Anim. Evert. ser. 1, Moll. 1831, *decas prima*, signature *d*, third page; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 307.

No. 6, genus *Pupa*, Hutton, J. A. S. B. iii, 1834, p. 85; No. 6, *Pupa* (*mihi*) cylindrical? ibid., tom. cit. p. 93.
Bulimus (*Cylindrus*) *insularis*, Albers, Die Heliceen, 1850, p. 180.
Bulimus insularis, Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 403; ibid., Conch.-Cab., *Bulimus*, 1854, p. 125, pl. 36, figs. 26–28; Hanley & Theobald, Conch. Ind. 1870, pl. 22, fig. 10; Bourguignat, Ann. Sci. Nat., Zool. ser. 6, xv, 1883, art. 2, p. 65.
Chondrus (*Mastus*) *insularis*, Adams, Gen. Rec. Moll. ii, 1855, p. 165.
Buliminus (*Cylindrus*) *insularis*, Jickeli, Nova Acta K. Leop.-Carol. Akad. Wiss. xxxvii, no. 1, 1874, p. 108, pl. 5, fig. 4; Kobelt, Conchyl. Buch, ii, 1878, p. 273, pl. 84, fig. 21.
Pupa (*Cylindrus*) *insularis*, Nevill, J. A. S. B. xlvi, 1877, p. 22; ibid., Hand List, i, 1878, p. 195; ibid., in Anderson, Zool. Res. Exp. W. Yunnan, i, 1879, p. 882.
Cylindrus insularis, Theobald, J. A. S. B. xlvii, 1878, p. 146.
Bulimina (*Mastus*) *insularis*, Pfeiffer, Nomencl. Helic. Viv. 1881, p. 293.
Rumina insularis, Bourguignat, Moll. Choa, 1885, p. 22; Jousseaume, Bull. Soc. Malac. France, vi, 1889, p. 359.
Buliminus (*Zootecus*) *insularis*, Westerlund, Fauna Paläarct. Binnenconchyl. iii, 1887, p. 75; Katal. Paläarct. Binnenconch. 1890, p. 92.
Buliminus insularis, Pollonera, Bull. Soc. Malac. Ital. xiii, 1888, p. 70; von Martens, Nachr. Deuts. Malak. Ges. 1889, p. 151; Smith, Proc. Malac. Soc. London, i, 1894, p. 142.
Chilogymnus insularis, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 289.
Stenogyra insularis, von Martens, Arch. Naturg. lxi, 1895, 1, p. 103, pl. 8, figs. 5, 6 (jaw and radula).
Buliminus (*Mastus*) *insularis*, Pollonera, Boll. Mus. Zool. Torino, xiii, 1898, no. 313, p. 6; Peile, Journ. Bombay Nat. Hist. Soc. xi, 1908, p. 131.
Zootecus insularis, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 106, pl. 26, fig. 21.

Original description:—"*Pupa insularis*, subcylindrica, apice attenuata, subacuta, nitida, albido-cornea, subtilissime transverse striata, striis apicem versus angustioribus, pellucida, apertura semiovata, margine paululum reflexo, leviter calloso; anfractibus 7 ad 8, tribus primis diametro subæqualibus.

"Max. sp. long. $5\frac{1}{2}$ lin., lat. $1\frac{3}{4}$, 8 spiræ anfr. Alia sp. $5\frac{1}{4}$ long., $1\frac{3}{4}$ lata, anfr. 7." (*Ehrenberg.*)

Hab. Cameran Island, Red Sea (type locality, *Ehrenberg*). India: Delhi, Bundelkund (*Hanley & Theobald*); Kudapah, Tinali (*Stoliczka*); Patna (*Mainwaring*); Northern and Central India (*Theobald, Hutton*); Saharunpore (*Wood-Mason*); Kutch and Sind (*Stoliczka, Blanford*); Poona (*Blanford, Fairbank*); Salt Range and Lake Sambhur (*Theobald, Wynne*); Burwani Hills (*Blanford*); Rajputana (*Hackett*); Kashmir (*Theobald*); Bombay Island (*Peile*); Trichinopoli (*Nevill, Blanford*). Burma: Pagan (*Anderson, Nevill*). Ceylon (*Nevill, Blanford, Simon*).

Zootecus insularis and its varieties have a very wide range outside the Indian region, extending, according to Pilsbry, from the

Cape Verde Islands and Senegambia eastward to Egypt, Abyssinia, Southern Arabia, to Beluchistan. To the somewhat cursory original description, he adds the following particulars. "The sculpture consists of fine, close, subvertical striæ, a little bent near the suture, and intersected by several (usually three to six) very narrow smooth spiral bands. These may be obsolete on the last whorl or two, though usually persistent. The whorls are moderately convex, the last ascending a trifle to the aperture. The outer lip is somewhat thickened inside, giving the appearance of a low white welt behind it externally. The edge itself is obtuse but not expanded. The columellar margin is dilated, thickened, and arches over the very small umbilicus. The species is excessively variable, but the typical form is small, specimens measuring as follows :—

"Length 10, diam. above aperture 3·8 mm., whorls $8\frac{1}{3}$.
"Length 9, diam. above aperture 3·3 mm., whorls $7\frac{1}{2}$.
"Length 8, diam. above aperture 3·2 mm., whorls $7\frac{1}{4}$.

"This small form is common in Arabia and India. The shell is thinner and usually more whitish-corneous, less opaque-white than the large forms.

"Shells of the same general type but more robust have been found in both Africa and India, and numerous nominal species have been based upon them. It is quite likely that some of these may be found to be local races worthy of recognition by name."

334. Zootecus estellus, *Benson.*

Bulimus estellus, Benson, A. M. N. H. ser. 2, xix, 1857, p. 327; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 462; Hanley & Theobald, Conch. Ind. 1870, pl. 22, fig. 4.

Pupa (Cylindrus) insularis, var. *estellus*, Nevill, Hand List, i, 1878, p. 195.

Bulimina (Mastus) estella, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 293.

Buliminus (Zootecus) estellus, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 675, pl. 102, figs. 16, 17.

Original description :—"Testa arcte perforata, oblonga, cylindrica, subremote spiraliter sulculosa, interstitiis confertissime costulato-striolatis, albida; spira cylindricea, apice conico, acutiusculo; sutura impressa; anfractibus 8 vix convexiusculis, ultimo antice ascendente, $\frac{1}{3}$ testæ parum æquante, basi circa perforationem leviter impressa; apertura verticali, angulato-ovali, peristomate obtuso, margine columellari verticali, incrassato-reflexo.

"Long. 18, diam. 6 mill." (*Benson.*)

Hab. India: Sind (*Baker*); Kudapah; Balmir, Jodhpore (*Stoliczka*).

"At once distinguishable from the allied *B. pullus*, Gray, by its stouter form, and by the ascent of the last whorl near the aperture." (*Benson.*)

335. **Zootecus pertica**, *Benson.*

Bulimus pertica, Benson, A. M. N. H. ser. 2, xix, 1857, p. 328; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 462; Hanley & Theobald, Conch. Ind. 1870, pl. 22, fig. 7.
Pupa (Cylindrus) pertica, von Martens, Die Heliceen, ed. 2, 1860, p. 297.
Bulimina (Mastus) pertica, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 293.
Buliminus (Zootecus) pertica, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 682, pl. 103, fig. 9.
Zootecus insularis, var. *pertica*, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 113, pl. 26, fig. 23.

Original description:—"Testa imperforata, exacte cylindrica, elongatissima, confertissime arcuato-striolata, sulcis nonnullis inconspicuis spiraliter sculpta, alba; spira cylindrica, apice conico, obtusiusculo; sutura impressa; anfractibus 10 subplanulatis, ultimo $\frac{1}{5}$ testæ æquante, antice leviter descendente, basi rotundata; apertura valde obliqua, pyriformi; peristomate tenui, margine basali incrassato, subeffuso, columellari expanso, appresso.

"Long. 20, diam. 5 mill." (*Benson.*)

Hab. India (*Baker*); Sind (*Hanley & Theobald*).

At once distinguishable from *Z. pullus* and its allies by its lengthened cylindrical form, its slenderness, and by the obliquity of the aperture. It may be considered as the extreme form of the series. According to Nevill it is based on an abnormal specimen of *Z. polygyratus.*

336. **Zootecus polygyratus**, *Reeve.*

Bulimus polygyratus, Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 79, fig. 578; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 404; Issel, Mem. Real. Accad. Sci. Torino, ser. 2, xxiii, 1866, p. 416.
Chondrus (Mastus) polygyratus, Adams, Gen. Rec. Moll. ii, 1855, p. 165.
Bulimus (Cylindrus) polygyratus, Pfeiffer, Malak. Blätt. ii, 1856, p. 155.
Mastus polygyratus, Chenu, Man. Conchyl. i, 1860, p. 442, fig. 3246.
Pupa (Cylindrus) insularis, var. *polygyrata*, Nevill, Hand List, i, 1878, p. 195.
Bulimina (Mastus) polygyrata, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 293.
Rumina polygyrata, Ancey, Bull. Soc. Malac. France, iii, 1886, p. 63.
Zootecus polygyratus, Kobelt, Conch.-Cab., Fam. Buliminidae, 1902, p. 947, pl. 132, figs. 26, 27.
Zootecus insularus, var. *polygratus*, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 113, pl. 26, fig. 31.

Original description:—"Shell pyramidally turreted, minutely umbilicated, whorls nine to ten in number, rather narrow, rounded, finely plicately striated, columella reflected, aperture small, lip simple; bluish-white." (*Reeve.*)

Hab. India: Rohra Hills, Sind (*Blanford*). Beluchistan: Gwadar (*Blanford*). Persia: Bendes Abbas (*Issel*). Arabia: Aden (*Blanford*).

When described and figured by Reeve the habitat was unknown. It is more cylindrical than *Z. insularis*, forming a connecting link between that and *Z. pertica*. The type, which is in the British Museum, is composed of 9½ whorls and measures: length 12 mm., diameter 4 mm.

337. **Zootecus pullus**, *Gray*.

Bulimus pullus, Gray, P. Z. S. 1834, p. 66; Th. Müller, Syn. Test. Viv. Anno 1834 promulg., 1836, p. 15; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 162; Reeve, Conch. Icon. v, 1849, *Bulimus*, pl. 67, fig. 476; Blanford, J. A. S. B. xxxiv, 1865, p. 94; Adams, Journ. Conch. vii, 1892, p. 81.
Pupa, No. 6, Hutton, J. A. S. B. iii, 1834, p. 85.
Pupa cylindrical?, Hutton, J. A. S. B. iii, 1834, p. 93.
Pupa indica (Benson), Hutton (nom. mut.) (not *P. indica*, Pfeiffer, 1854), J. A. S. B. xviii, 1849, p. 653.
Bulimus (*Opeas*) *pullus*, Albers, Die Heliceen, 1850, p. 175.
Pupa (*Cylindrus*) *pulla*, von Martens, Die Heliceen, ed. 2, 1860, p. 297; ibid., Malak. Blätt. xv, 1868, p. 160 (= *P. cylindrica*, Hutton).
Bulimina (*Mastus*) *pulla*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 293.
Rumina pulla, Ancey, Bull. Soc. Malac. France, iii, 1886, p. 61.
Stenogyra pulla, von Martens, Arch. Naturg. lxi, 1895, 1, p. 103, pl. 8, figs. 7, 8 (jaw and radula).
Zootecus insularis, var. *pullus*, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 110, pl. 26, figs. 26–28.

Original description:—"Bul. testa ovata, subcylindrica, subimperforata, pellucida, albida, tenuiter striata, apice conico, obtusiusculo, pellucido; anfractibus novem vel decem vix elevatis; apertura parva, subrotunda, semilunata; labiis subincrassatis rotundatis.

"Axis 10, diam. 4¼ lin." (*Gray*.)

Hab. India: Bank of Ganges (*Royle*, teste *Müller*); Ava (*Blanford*); Delhi, Bundelkhund (*Reeve*); Kutch, Agra, Trichinopoli (*B. M.*).

Gray, who omitted to indicate the habitat when describing the species, states that it resembles *B. kingii*, but is more solid and has a dark apex and pillar. His brief description may be supplemented by Hutton's observations on the species in 1849, when he substituted the MS. name *Pupa indica* of Benson for *P. cylindrica* proposed by himself in 1834, on account of the latter name having previously been employed by Michaud.

"The large variety has 9–10 whorls; is cylindriform and tapers suddenly to an obtuse apex; colour of living shells pale fuscous or earthy, but generally white; whorls closely wrinkled by coarse waving lines of increase; in fresh specimens faintly scored with

obsolete longitudinal furrows; shell wide, polished, thick and opaque. Aperture subquadrate, margins thickened and subreflected; varying from $\frac{11}{16}$ to $\frac{12}{16}$ inches in length. Animal dusky; ovo-viviparous.

"Var. A.—This is in all respects a perfect miniature of the foregoing, but it never seems to have more than eight whorls, and seldom exceeds $\frac{1}{2}$ an inch in length, it is far less ventricose and generally shows the obsolete longitudinal furrows more plainly. This variety occurs both in India and near Quettah in Afghanistan.

"Var. B.—With the general sculpture of the last, but shorter, seldom exceeding $\frac{7}{16}$ of an inch; whorls ventricose and spire more suddenly obtuse than either of the foregoing; with scarcely more than half the length of *P. indica*, it still rivals it in breadth, and the longitudinal furrows appear to be constant and better defined. Whorls usually seven in number, rarely eight." (*Hutton.*)

Specimens from Kutch, presented by A. T. Daniel to the British Museum, possess $9\frac{1}{4}$ whorls and measure 16×5 mm.; others, composed of eight whorls, only reach a length of 14 mm., with a diameter of 5 mm.

338. Zootecus agrensis, *Kurr.*

Bulimus agrensis, Kurr, Malak. Blätt. ii, 1856, p. 107; Pfeiffer, Novit. Conch. ser. 1, i, 1856, p. 57, pl. 16, figs. 9, 10; ibid., Mon. Helic. Viv. iv, 1859, p. 463; Hanley & Theobald, Conch. Ind. 1870, pl. 23, fig. 1.

Bulimus (Cylindrus) agrensis, Pfeiffer, Malak. Blätt. ii, 1856, p. 155.

Pupa (Cylindrus) agrensis, von Martens, Die Heliceen, ed. 2, 1860, p. 297.

Bulimina (Mastus) agrensis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 293.

Buliminus (Zootecus) agrensis, Kobelt, Conch.-Cab., Fam. Buliminidae, 1901, p. 686, pl. 103, fig. 19.

Zootecus insularis, var. *agrensis*, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 111, pl. 26, figs. 24, 25.

Original description:—"T. perforata, cylindraceo-turrita, lævigata, nitida, alba; spira elongata, sursum sensim attenuata, apice acutiuscula; sutura impressa; anfr. 9 convexiusculi, ad suturam striati, ultimus $\frac{1}{3}$ longitudinis non attingens, antice subascendens, basi rotundatus; apertura verticalis, rotundato-lunaris; perist. simplex, rectum, margine dextro leviter arcuato, columellari subverticali, anguste fornicatim reflexo.

"Long. 46, diam. 6 mill.; ap. 5 mill. longa, $3\frac{1}{3}$ lata." (*Kurr.*)

Hab. India: Agra (*Kurr*).

Apparently a rare species, which differs from *Z. insularis* in being smoother and in having the later whorls distantly radiately plicate-striate; the aperture is also a little more transversely elongate.

339. **Zootecus chion**, *Pfeiffer.*

Bulimus chion, Pfeiffer, P. Z. S. 1856, p. 332; ibid., Mon. Helic. Viv. iv, 1859, p. 463; Hanley & Theobald, Conch. Ind. 1870, pl. 22, fig. 1; Adams, Journ. Conch. vii, 1892, p. 81.
Pupa (Cylindrus) chion, von Martens, Die Heliceen, ed. 2, 1860, p. 297.
Pupa (Cylindrus) insularis, var. *chion*, Nevill, Hand List, i, 1878, p. 195.
Buliminus (Mastus) chion, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 293.
Rumina chion, Ancey, Bull. Soc. Malac. France, iii, 1886, p. 60.
Mastus chion, Ancey, Bull. Soc. Zool. France, xviii, 1893, p. 44.
Buliminus (Zootecus) chion, Kobelt, Conch.-Cab., Fam. Buliminidae, 1900, p. 675, pl. 102, fig. 18.
Zootecus insularis, forma *chion*, Pilsbry, Man. Conch. ser. 2, xviii, 1906, p. 112, pl. 26, fig. 32.

Original description:—"B. testa perforata, oblonga, solida, striatula, alba; spira elongata, in conum acutiusculum terminata; anfr. 7–8 modice convexis, ultimus $\frac{1}{3}$ longitudinis paulo superante, antice subascendente, basi rotundato; apertura verticalis, ovato-lunari; perist. calloso, marginibus callo junctis, columellari brevi, substricto, dilatato, patente.

"Long. 12, diam. $5\frac{1}{2}$ mill. Ap. oblique $4\frac{1}{3}$ mill. longa, fere 3 lata." (*Pfeiffer.*)

Hab. India: Kurrachee, Punjab (*Shipley, Stoliczka, Adams*); Kutch, and Soliman Range (*Stoliczka*); Umarkote, Sind (*Blanford*); Saharunpore (*Wood-Mason*). Afghanistan (*Ancey*).

Specimens from Hyderabad, presented by Dr. Falconer to the British Museum, measure 14 × 6 mm.

Pfeiffer mentions a var. β. "Gracilior, minor; long. 11, diam. 4 mill."

Family FERUSSACIDÆ.

Genus **CÆCILIOIDES**, *Herrmannsen.*

Acicula, Risso, Hist. Nat. Europe Mérid. iv, 1826, p. 81 (*eburnea* only species), non *Acicula*, Hartmann, 1821.
Caecilioides, Herrmannsen, Ind. Gen. Malac. i, 1846, p. 150, for *Cecilioides*, Férussac.
Cæcilioides, Smith, Journ. Conch. vi, 1891, p. 342; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 1.
Cæcilianella, Bourguignat, Rev. Mag. Zool. viii, 1856, p. 378; Fagot, Bull. Soc. Malac. France, iv, 1887, p. 49; Norman, A. M. N. H. ser. 6, vi, 1890, p. 337.
Aciculina, Westerlund, Fauna Paläarkt. Binnenconch. iii, 1887, p. 175 (as section of *Cæcilianella*).

Type, *Buccinum acicula*, Müller.

Range. India and most tropical and subtropical countries and Europe.

"The shell is imperforate, very small and slender, very narrowly lanceolate, with obtuse, rounded, smooth apex; smooth, fragile, transparent (weathering to opaque white); aperture usually less than half the total length, piriform; outer lip arching forward in the middle, acute; columella concave, more or less distinctly truncate at base, usually somewhat calloused. Animal blind, or at least without pigmented eyes. Jaw composed of many narrow plaits. Radula with 11, 1, 11 teeth in *C. acicula*, 18, 1, 18 in *C. gundlachi*, the central tooth much smaller than the laterals, with a tricuspid reflection. Laterals symmetrical, tricuspid. Marginal teeth low, wide, with two low denticulate cusps. The genitalia, as figured by Lehmann for *C. acicula*, have the duct of the spermatheca very short. An appendix, enlarged at the end, is terminal on the penis. There is also a short accessory organ anteriorly to the penis." (*Pilsbry.*)

Subgenus **GEOSTILBIA**, *Crosse.*

Geostilbia, Crosse, Journ. Conchyl. xv, 1867, p. 184; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 43 (as section of *Cæcilioides*).

Type, *G. caledonica*, Crosse.

Range. India, Philippine Islands, New Caledonia, Hawaiian Islands, West Indies, New Jersey, St. Helena, East Africa, Mauritius, Seychelles, Comoro Group, Nossi Bé.

Differs from typical *Cæcilioides* in having the columella not distinctly truncate, and having the outer lip thickened.

The subgenus consists of a small number of species, some of them of doubtful status. Two species are known from India. Some seem to owe their distribution to tropical cultivation, possibly that of sugar-cane, in a manner similar to that of *Opeas gracile* and *Subulina octona*.

340. **Cæcilioides balanus**, *Reeve.*

Achatina balanus (Benson), Reeve, Conch. Icon. v, 1850, *Achatina*, pl. 20, fig. 109; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 506; ibid., Conch.-Cab., *Bulimus*, 1860, p. 315, pl. 25, figs. 18, 19; Benson, A. M. N. H. ser. 3, xiii, 1864, p. 137; Hanley & Theobald, Conch. Ind. 1875, pl. 102, fig. 10; Blanford, J. A. S. B. xlv, 1875, p. 43.
Glandina balanus, Morelet, Journ. Conchyl. iii, 1852, p. 34.
Oleacina (*Ferussacia*) *balanus*, Adams, Gen. Rec. Moll. ii, 1855, p. 106.
Achatina (*Caecilioides*) *balanus*, Pfeiffer, Malak. Blätt. ii, 1856, p. 170.
Cionella (*Acicula*) *balanus*, von Martens, Die Heliceen, ed. 2, 1860, p. 261.
Francesia balanus, Paladilhe, Ann. Mus. Civ. Genova, iii, 1872, p. 11.
Caecilianella (*Geostilbia*) *balanus*, Nevill, Hand List, i, 1878, p. 162.
Geostilbia balanus, Theobald, J. A. S. B. xlvii, 1878, p. 147.

Cionella (*Cecilioides*) *balanus*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 335.
Cæcilioides (*Geostilbia*) *balanus*, Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 46, pl. 4, figs. 60, 61.

Original description :—" Shell cylindrically oblong, somewhat fusiform, whorls four in number, smooth, shining, apex obtuse, columella arched, truncated, aperture small; dull white." (*Reeve.*)

Hab. India: Agra (*Boys*); Banks of the Jumna, near Humeerpore, Bundelkhund (*Benson*); Kattiwar, near Agra (*Theobald*); Deccan and Sind (*Blanford, Theobald*); Kashmir (*Theobald*).

" T. subcylindraceo-acicularis, laevigata, hyalina; spira subcylindracea, vix attenuata, obtusa; anfr. 4 plauiusculi ultimus $\frac{2}{5}$ longitudinis subaequans, basi dilatatus; columella substricte recedens, ad basin aperturae late angulato-ovalis vix truncata; perist. simplex, rectum, acutum.

" Long. 3, diam. vix 1 mill.; ap. $1\frac{1}{3}$ mill. longa." (*Pfeiffer.*)

Blanford was of opinion * that the shell described by Crosse as *Geostilbia caledonica* †, from New Caledonia, was co-specific with *balanus*, but the figure of the former does not lend any colour to this view.

341. **Cæcilioides bensoni**, sp. n.

Shell narrowly cylindrico-conoid, almost fusiform, rather thin, opaque white, smooth and glossy. Spire narrow, with straight sides; suture linear, submarginate; apex obtuse. Whorls 6, flattened, increasing slowly at first, the last four very rapidly.

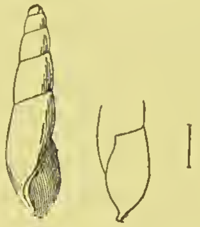

Fig. 121.—*Cæcilioides bensoni.*

Aperture oblique, pyriform, the margins united by a thin callus on the parietal wall; peristome slightly thickened; outer margin straight, obliquely descending and curving forward; basal margin regularly curved; columella slightly curved and slightly truncate.

Length 5, diam. 1·25 mm.

Hab. India: Plains. Type in the British Museum.

This new species differs from *C. balanus*, besides being con-

* J. A. S. B. xliv, 1875, p. 43.
† Journ. Conchyl. xv, 1867, p. 186, pl. 7, fig. 4.

siderably larger, in having a wider base, and the whorls increase less rapidly at first, while the basal margin of the aperture is more curved.

Genus COILOSTELE, *Benson.*

Coilostele, Benson, A. M. N. H. ser. 3, xiii, 1864, p. 136; Pilsbry, Man. Conch. ser. 2, xix, 1908, p. 338.
Cœlostele, Blanford, J. A. S. B. xlv, 1875, p. 42.
Cœlestele, Bourguignat, Descr. div. Esp. *Cœlestele* et *Paladilhia*, 1880, p. 6.

TYPE, *C. scalaris*, Benson.

Range. India, Aden, Syria, Abyssinia, Egypt, Southern Spain. Mexico (? introduced).

"Shell minute (3 to 4 mm. long), fragile, somewhat transparent, imperforate, long and narrow, *subcylindric*, or tapering slightly to the *very obtuse rounded summit*, composed of 6 to 8 flattened whorls separated by *deep sutures*, the first $2\frac{1}{2}$ or 3 whorls smooth, the rest either smooth, striate, or ribbed. Aperture small, oblong, more or less oblique, the outer lip usually expanded slightly in fully adult shells, straight in profile. Columella having a low fold at its junction with the parietal wall. *Internal partitions absorbed in adult shells*, leaving only the internal spiral cord along the sutures. Soft anatomy unknown.

"A genus of uncertain position, remarkable for the cylindrical shape of the minute, fragile, slender shell, and the absorption of the internal partitions, which I have verified in *C. tampicolensis*. They have been found up to this time only as dead shells in the drift débris of rivers and streams, where they occur in great profusion though it seems quite locally. Nothing is known of the life-history or soft parts." (*Pilsbry.*)

The genus has a rather remarkable distribution. The occurrence, however, in Mexico of a single species may be due to importation from Spain, as suggested by Prof. Pilsbry. A fossil species from the Eocene of Italy has been referred to *Coilostele* *, and, if correctly so assigned, the centre of the distribution of the genus may possibly be that region.

342. Coilostele scalaris, *Benson.*

Coilostele scalaris, Benson, A. M. N. H. ser. 3, xiii, 1864, p. 136; Hanley & Theobald, Conch. Ind. 1876, pl. 156, fig. 5; Pilsbry, Man. Conch. ser. 2, xix, 1908, p. 339, pl. 50, fig. 3.
Cœlostele scalaris, Blanford, J. A. S. B. xlv, 1875, p. 42; Theobald, op. cit. xlvii, 1878, p. 147; Nevill, Hand List, i, 1878, p. 162; Tryon, Struct. Syst. Conch. iii, 1884, p. 95, pl. 102, fig. 79.
Cœlestele scalaris, Bourguignat, Descr. div. Esp. *Cœlestele* et *Paladilhia*, 1880, p. 10.

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* *Coelostele eocaena*, Oppenheim, Zeits. Deuts. Geol. Gesells. xlvii, 1895, p. 119, pl. 3, fig. 10.

Original description:—"C. testa imperforata, elongato-cylindrica, lævi, hyalina, nitida; spira elongata, gradatim scalariter attenuata, apice obtuso, sutura profunda; anfractibus 6, convexiusculis, superne obtuse angulatis, penultimo cylindraceo; apertura subobliqua, semiovata, subpyriformi; peristomate tenui, recto, marginibus remotis, margine columellari crassiusculo, plica spirali obliqua elongata superne intrante munito.

"Long. 3, diam. vix 1 mm. Apert. $\frac{2}{3}$, lata $\frac{1}{2}$ mm." (*Benson.*)

Hab. India: Humeerpore, Bundelkhund, banks of Jumna and Betwa Rivers (*Benson*); Kashmir (*Theobald*); Sind (*Blanford*).

The British Museum contains three specimens, the only ones I have seen, labelled "Northern India"; they measure: length 4 mm., diam. 1·5 mm.

Genus **GLESSULA**, *von Martens.*

Electra, Albers, Die Heliceen, 1850, p. 194 (as section of *Achatina*), only species, *A. ceylanica* (non *Electra*, Lam. 1816, non *Electra*, Steph. 1829, non *Electra*, Loew, 1845); Adams, Gen. Rec. Moll. ii, 1855, p. 105 (as subgenus of *Oleacina*); Pfeiffer, Malak. Blätt. ii, 1856, p. 168 (as section of *Achatina*).

Glessula, von Martens, Die Heliceen, ed. 2, 1860, p. 254 (as subgenus of *Cionella*), type *A. gemma*, Benson; Pfeiffer & Clessin, Mon. Helic. Viv. 1881, p. 329; Nevill, Hand List, i. 1878, p. 166 (as subgenus of *Stenogyra*); Beddome, Proc. Malac. Soc. London, vii, 1906, p. 160; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 50, pl. 15, figs. 2, 3 (anatomy).

TYPE, *Achatina ceylanica*, Pfeiffer.

Range. India, Ceylon and Burma, South-Western China, Farther India; Sumatra, Java, and Borneo; East and West Africa.

"The shell is imperforate, ovate-conic or turrite, brown or corneous-brown, glossy, and usually without strong sculpture; apex obtuse. Aperture irregularly oval; outer lip unexpanded, acute or blunt; columella short, more or less deeply concave, abruptly truncate at the base.

"Sole without distinct median area; no pedal margin; an outer mantle lobe on the left side. Kidney very long, band-like. Genitalia peculiar; there is a feather-like gland where the vas deferens enters the penis. The latter contains a short conic, perforated papilla, and two longitudinal folds. The prostrate gland of the hermaphrodite duct consists of entirely separated narrow follicles, as in *Achatina*. The spermatheca has a short duct. Uterus containing several large shells with fully 2 whorls.

"The jaw is very finely striate, almost smooth. Radula has about 110 teeth in a transverse row. The central tooth is very small, tricuspid; laterals with three cusps; outer marginal teeth very finely 3- or 4-cusped (*G. orophila*, from Madras, according to Semper).

"*Glessula* was associated with "*Cionella*" (that is the FERUSSACIDÆ as herein understood) by Professor von Martens in 1860.

Various other authors, both before and since, have thought the group Achatinoid, belonging to "*Stenogyra*" in the former wide limits of that term. We know too little of its anatomy to give a definite opinion, but the presence of a glandular appendage (appendix or flagellum) at the end of the penis is a feature unlike any *Achatinidæ*. The homology of this appendage is not certain, however. The position of the ureter is unknown. I have been unable to obtain alcoholic material necessary for an investigation of the relations of *Glessula* to *Subulina*, *Homorus*, *Bacillum*, and *Pseudoglessula*.

"In most (but perhaps not all) species, the lip becomes slightly blunt and smooth in fully adult shells, thereby differing from *Subulina*, which has an acute lip at all stages of growth.

"In *G. orophila*, Semper found in the uterus 4 large embryos with shells having fully two whorls, and a small one with a half whorl and very large caudal vesicle. Various other species have been found to be viviparous, while others bring forth globular eggs like those of *Subulina*. Like that genus, also, the *Glessulæ* reproduce before attaining full size.

"*Glessula* has been studied mainly by specialists on the Indian fauna. Benson, W. T. Blanford, Beddome, and Godwin-Austen have chiefly contributed to the literature. Blanford's 'Contributions to Indian Malacology,' continued through many years of the Journal of the Asiatic Society of Bengal, contain a great mass of information on this genus, as on many others of the Indian fauna. Hanley and Theobald illustrated most of the types of Benson, amongst others, in their 'Conchologia Indica.' Finally, Colonel R. H. Beddome has recently reviewed the genus in his 'Notes on Indian and Ceylonese Species of *Glessula*.'

"From the purely conchological standpoint we may be said to have an extensive knowledge of *Glessula*, yet various characters of the first importance have been neglected. *The embryonic whorls of the types must all be re-examined and their sculpture described.* Our ignorance of the embryonic sculpture of many forms prevents any natural classification of the species. The surface of the later whorls in all the species should be examined under high power, since some species have a minute sculpture not visible with an ordinary hand-lens.

"No fossil species of *Glessula* are known to me." (*Pilsbry.*)

343. **Glessula tenuispira**, *Benson*.

Achatina tenuispira, Benson, J. A. S. B. v, 1836, p. 353; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 262; Reeve, Conch. Icon. v, 1849, *Achatina*, pl. 16, fig. 76; Benson, A. M. N. H. ser. 3, v, 1860, p. 464; Pfeiffer, Conch.-Cab., *Bulimus*, 1860, p. 310, pl. 25, figs. 6, 7; Blanford, J. A. S. B. xxxiv, 1865, p. 95.
Subulina tenuispira, Adams, Gen. Rec. Moll. ii, 1855, p. 110.
Achatina (*Subulina*) *tenuispira*, Pfeiffer, Malak. Blätt. ii, 1856, p. 169.

Achatina (*Electra*) *tenuispira*, Hanley & Theobald, Conch. Ind. 1870, pl. 36, fig. 8.
Stenogyra (*Glessula*) *tenuispira*, Nevill, Hand List, i, 1878, p. 169.
Stenogyra (*Subulina*) *tenuispira*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 327.
Glessula tenuispira, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 160; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 88, pl. 9, figs. 1, 4.

Original description :—" Testa elongato-turrita, cornea, longitudinaliter striata, versus apicem attenuata, columnari; anfractu ultimo interdum fasciis quibusdam albidis transversis ornata, suturis impressis; apice obtuso.

"Long. 1 poll. [=25 mill.] circiter, lat. 0·55 [=14 mill.]." (*Benson.*)

Hab. India: Sylhet (*Benson*); Darjeeling (*Stoliczka*, *Blanford*, & *Mainwaring*); N. Canara (*Beddome*); Khasi and Dafla Hills (*Godwin-Austen*). Burma: Akoutong and further south (*Blanford*); banks of Irawaddy (*Theobald*).

The measurement given by Benson—width 0·55 inch—is evidently a lapsus or a printer's error for 0·25, as the Cumingian specimens measure 7 mill., *i. e.* a trifle over ¼ inch, the length being 28 mill., a little exceeding one inch, therefore.

Many specimens found in collections are evidently immature. The Beddome collection contains a shell, composed of fourteen whorls, which measures 41·5 mm. in length and 9 mm. in diameter.

344. Glessula baculina, *Blanford.*

Glessula baculina, Blanford, J. A. S. B. xl, 1871, p. 43, pl. 2, fig. 6; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 160.
Achatina (*Electra*) *baculina*, Hanley & Theobald, Conch. Ind. 1874, pl. 78, fig. 6.
Achatina baculina, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 291.
Stenogyra (*Glessula*) *baculina*, Nevill, Hand List, i, 1878, p. 170.
Stenogyra (*Subulina*) *baculina*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 327.
Glessula tenuispira, var. *baculina*, Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 88, pl. 9, fig. 2.

Original description :—" Testa elongato-turrita, gracilis, tenuiuscula, oblique striata, fusco vel fulvo cornea, epidermide nitescente induta. Spira turrita, apice obtusulo. Anfractus 13½, parum convexi; inferiores subæquales; sutura impressa, minute denticulata. Apertura obliqua, ovato-triangularis; peristoma simplex, acutum. Columella abrupte arcuata, oblique producta, ad basin verticaliter truncata." (*Blanford.*)

Alt. 38 mm.; diam. 6·5–7·5 mm. Aperturæ: alt. 7, lat. 4 mm.

Hab. Sikkim Himalayas, Khersiong (*Stoliczka*); Darjeeling (*Blanford*, *Mainwaring*); Khasi Hills (*Godwin-Austen*).

" This species appears to have escaped the notice of all previous collectors in Sikkim; it was found in association with its near

ally *G. tenuispira*, Bens., by Dr. Stoliczka during a recent visit. It is easily distinguished from the latter species by its slenderness (the diameter being $\frac{1}{6}$ of the length), and the comparative narrowness of its whorls; moreover, by the form of the columella, the lower part of which is bent abruptly almost at right angles with the slope of the inner lip; while in *G. tenuispira*, *G. erosa*, and other allied forms, the curvature is at the utmost obtuse. Specimens, the shell of which has been slightly weathered, shew fine spiral markings, but these are not visible unless the shell has become somewhat opaque. The animal is dark leaden grey, somewhat paler at the sides of the foot." (*Blanford.*)

Beddome thought this only a more slender form of *tenuispira*, and Pilsbry reduced it to varietal rank, but I consider *baculina* sufficiently distinct to retain it as a species. The shell is more cylindrical and more strongly striated than *tenuispira*, while it is distinguished from *shiplayi* in being more shining and in having the whorls more flattened.

A specimen from Darjeeling, in the Beddome collection, is composed of $12\frac{1}{2}$ whorls and measures 32×6 mm.

345. **Glessula pertenuis**, *Blanford.*

Achatina pertenuis, Blanford, J. A. S. B. xxxiv, 1865, p. 79; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 237.
Achatina (Electra) pertenuis, Hanley & Theobald, Conch. Ind. 1870, pl. 18, fig. 5.
Stenogyra (Glessula) pertenuis, Nevill, Hand List, i, 1878, p. 169.
Stenogyra (Subulina) pertenuis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 327.
Glessula pertenuis, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 160.
Glessula tenuispira, var. *pertenuis*, Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 89, pl. 9, fig. 3.

Original description:—" Shell very slender, turrited, thin, light horny, polished, closely, minutely, and rather irregularly striated. Spire subulate, somewhat acuminate towards the blunt apex; suture impressed, subcrenulate. Whorls 11–12, convex, the last about $\frac{1}{5}$ the length of the spire. Aperture oblique, ovately pyriform, peristome thin, margins united by a thin callus, columella moderately curved, obliquely truncated." (*Blanford.*)

Length 20, diam. $4\frac{1}{2}$, length of aperture 4 mm.

Hab. Burma: Tongoop, Arakan (*Blanford*); Arakan (*Stoliczka*); Akoutong (*Theobald*); Thyet Myo (*Hungerford*). India: Assam (*Stoliczka*); Garo Hills (*Godwin-Austen*).

" A much more slender species than *A. tenuispira*, Bens. (a variety of which also abounds in parts of Pegu), though there are signs of a passage. The present appears to replace *A. tenuispira* in Arakan and Bassein. Mr. Benson, to whom I sent a specimen, observes that it is intermediate between *A. tenuispira* and *A. hastula*, Bens." (*Blanford.*)

Beddome considered this species probably an immature form of *tenuispira*, and Pilsbry regards it as a variety. The more flattened whorls and the acuminate upper portion of the spire, however, appear to me to warrant its being accorded specific rank.

Var. major, *Blanford*.

Length $26\frac{1}{2}$ mm.; diameter 6; length of aperture 6. Of another specimen: length 23 mm.; diameter $5\frac{2}{3}$; length of aperture $5\frac{1}{4}$ mm.

Hab. Burma: Pyema Khyoung, Bassein district, Pegu.

346. Glessula shiplayi, *Pfeiffer*.

Achatina (*Subulina*) *shiplayi*, Pfeiffer, Malak. Blätt. ii, 1855, p. 169.
Achatina shiplayi, Pfeiffer, Novit. Conch. ser. 1, i, 1856, p. 82, pl. 22, figs. 13, 14; Blanford, J. A. S. B. xxx, 1861, p. 364.
Achatina (*Electra*) *shiplayi*, Hanley & Theobald, Conch. Ind. 1870, pl. 36, fig. 9.
Stenogyra (*Glessula*) *shiplayi*, Nevill, Hand List, i, 1878, p. 168.
Stenogyra (*Subulina*) *shiplayi*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 326.
Glessula shiplayi, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 161; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 61, pl. 9, fig. 8.

Original description:—"T. turrita, tenuissima, sublaevigata, pellucida, nitida, cornea; spira regulariter attenuata, apice obtusa; sutura substriata; anfr. 13 convexi, ultimus $\frac{1}{5}$ longitudinis paulo superans, rotundatus, distinctus striatus; columella substricte procedens, basi sublate truncata; apertura parum obliqua, rotundato-ovalis; perist. rectum tenuissimum." (*Pfeiffer*.)

Long. $25\frac{1}{2}$, diam. $6\frac{1}{3}$ mill. Ap. $5\frac{1}{2}$ mill. longa, $3\frac{1}{4}$ lata.

Hab. India: Nilgiri Hills (*Shiplay*, *Nevill*); Patchamully and Kalryenmullay Hills (*Blanford*); Shevroy Hills (*Beddome*).

Beddome states that full-grown specimens were very rarely found by him, "though young, half-, and three-quarter-grown ones are most abundant on the Nilgiris. This and some other species certainly breed before the shell attains full size or a hardened peristome, as I have taken eggs from such shells. The peristome differs much in mature specimens, sometimes being very thick and solid, sometimes quite thin, but, even then, firm and not breaking or becoming jagged at the least touch, which is the sign that the shell has not finished its growth. Full-grown examples of *shiplayi* are very like *tenuispira*, but smaller. The species is, in fact, intermediate between the latter and *baculina*, but the whorls are more convex and increase more suddenly than is the case in either of the other two species. It also runs *nilagirica* very closely, but the latter has a stronger sculpture, and is broader at the base."

347. Glessula nilagirica, *Reeve* (em.).

Achatina nilagarica (Benson), Reeve, Conch. Icon. v, 1850, pl. 21, fig. 87.
Achatina perrotteti, var. *nilagirica*, Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 494.
Achatina perrotteti, var., Pfeiffer, Conch.-Cab., *Bulimus*, 1860, p. 324, pl. 25, figs. 2, 3.
Achatina (*Electra*) *perrotteti*, Hanley & Theobald, Conch. Ind. 1870, pl. 35, fig. 6 (*non* Pfr.).
Stenogyra (*Glessula*) *nilagirica*, Nevill, J. A. S. B. l, 1881, p. 136, pl. 5, fig. 15.
Glessula perrotteti, var. *nilagiriea*, Pfeiffer & Clessin, Mon. Helic. Viv. 1881, p. 330.
Glessula nilagirica, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 161.
Glessula nilagarica, Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 90, pl. 9, fig. 5.

Original description :—" Shell pyramidally turreted, whorls ten in number, convex, very finely crenulated at the sutures, then striated, columella rather deeply arched, aperture small; brown-horny." (*Reeve.*)

Hab. India: Nilgiris (*Jerdon*).

" The shell I take to be this species is the one described by Nevill. I collected it both on the Nilgiris and Nullamullays (Kurnool). It is of the same length and has the same number of whorls as *shiplayi*, and is very like the full-grown shell of that species, only it has a more prominent striation, and is considerably broader towards the base. The young shell is conical from a broad base, the young of *shiplayi* being much more cylindrical. If Reeve's figure, copied by Nevill, is this species, it must be a small form of it. It is more probably *perrotteti*." (*Beddome.*)

348. Glessula hebes, *Pfeiffer*.

Achatina hebes (Blanford), Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 230; Hanley & Theobald, Conch. Ind. 1876, pl. 159, fig. 2.
Glessula hebes, Blanford, J. A. S. B. xxxix, 1870, p. 21, pl. 3, fig. 21; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 161; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 62, pl. 9, fig. 6.
Achatina (*Glessula*) *hebes*, Godwin-Austen, J. A. S. B. xlv, 1876, p. 315.
Stenogyra (*Glessula*) *hebes*, Nevill, Hand List, i, 1878, p. 167.
Stenogyra (*Subulina*) *hebes*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 326.

Original description :—" T. ventroso-turrita, pertenuis, irregulariter, praesertim ad suturam striata, pellucida, sericina, fulvo-cornea; spira elongata, apice obtusa; sutura impressa; anfr. 10 convexiusculi, ultimus $\frac{1}{4}$ longitudinis subaequans, basi rotundatus; apertura verticalis, rhombeo-elliptica; columella perarcuata, oblique anguste truncata; perist. simplex, tenue.

"Long. 17, diam. 5 mill. Ap. oblique $4\frac{1}{3}$ longa, $2\frac{2}{3}$ lata." (*Pfeiffer.*)

Hab. India: Deo Ghat, Poona (*Evezard*); Shevroy Hills (*Beddome*); Dafla Hills (*Godwin-Austen*); Pulney Hills (*Fairbank*); Koonoor Pass (*Nevill*); Mahableshwar (*Beddome*).

When first described by Pfeiffer he was unaware of the habitat of the species, although the specimens were forwarded direct to Cuming by Major Evezard. Two years after Blanford again described the species, and, as his diagnosis is based on better and more ample material, I append it.

"Testa sub-cylindrico turrita, tenuis, pallido-cornea, translucens, polita, striatula; spira elevata, subtus sub-cylindrica, lateribus versus apicem obtusum convexis; sutura impressa. Anfr. 9–$10\frac{1}{2}$ convexi, regulariter crescentes, ultimus brevis, $\frac{1}{4}$–$\frac{1}{5}$ longitudinis subæquans. Apertura ovato-oblongo, parum obliqua; peristoma tenue; columella valde arcuata, antice oblique truncata.

"Long. 17–22, diam. 5 mill. Ap. 4–$4\frac{1}{2}$ longa, $2\frac{1}{3}$–3 lata.

"The nearest ally to this species appears to be *G. tamulica*, W. and H. Blanf., from near Trichonopoli, which is distinguished by greater diameter in proportion to the length, and a more regularly tapering spire. Intermediate forms may hereafter be found, however.

"A specimen from the Shevroy Hills, near Salem in Southern India, sent to me by Major Beddome, only differs from *G. hebes* in being longer and slightly more attenuate towards the apex. It has 13 whorls." (*Blanford.*)

Beddome expressed considerable doubt as to its distinctness from *G. fairbanki*, stating that all the specimens of *G. hebes* he had seen were young, with unformed lip. He adds: "If full grown, or nearly so, it must be a much smaller species than *shiplayi*. It runs the young of that species rather closely, but the apex is generally blunter. Specimens collected by me on the Shevroys are referred here by Blanford; they are, however, immature, and appear rather to belong to *fairbanki*, if that species is distinct, which I doubt. . . . . . Hanley's figure of *hebes* has the tapering apex of young *shiplayi* and is unlike my type of *hebes*."

Glessula hebes has the whorls more narrowly coiled than *fairbanki*; other differences are indicated under the latter. The figure given by Blanford is rather poor, the striæ being more pronounced. Two specimens from the Shevroy Hills, in the Beddome collection, possess $9\frac{1}{2}$ whorls, one measures only 12 mm. and the other 13 mm.

349. **Glessula fairbanki**, *Benson.*

Achatina fairbanki, Benson, A. M. N. H. ser. 3, xv, 1865, p. 14; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 232.

Achatina (*Electra*) *fairbanki*, Hanley & Theobald, Conch. Ind. 1870, pl. 18, fig. 3.

Stenogyra (Subulina) fairbanki, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 326.
Glessula fairbanki, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 162; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 63, pl. 9, fig. 7.

Original description:—"A. testa subcylindraceo-turrita, striatula, obsolete et minutissime spiraliter decussata, polita, translucente, luteo-cornea; spira versus apicem ad latera subconvexa, vertice obtuso, sutura distincte impressa; anfractibus 8, subconvexis, brevibus, 4 ultimis in diametro lente accrescentibus, ultimo subtus rotundato $\frac{1}{4}$ longitudinis æquante; apertura subobliqua, ovata, superne subtusque angulata, marginibus callo junctis, columellari leviter arcuato, oblique truncato, dextro basalique tenuibus.

"Long. 12, lat. 4 mill. Apert., long. 3, lat. $2\frac{1}{2}$ mill." (*Benson.*)

Hab. India: Mahableshwar (*Fairbank*).

"The nearest Nilgiri form is *A. corrosula*, Pfr. The more cylindrical form below, the sculpture, shorter whorls, &c., safely distinguish it." (*Benson.*)

"A type-specimen sent me from Mahableshwar by Mr. Fairbank, and a few other examples I have seen in the Benson collection and elsewhere, are all young shells with unformed lips. It is smaller than *hebes*, but I cannot point out how it differs otherwise." (*Beddome.*)

While agreeing that the two forms are closely allied, they appear to me sufficiently distinct to be retained as separate species. *G. hebes* is not only proportionately larger but the last whorl is shorter in proportion to the spire than is the case in *fairbanki*, a feature which would still further be emphasized if one or two whorls were added to the latter, whereas the reverse would be the case if it were an immature form of *hebes*. *Glessula fairbanki* differs from *G. hebes* principally in the convex upper part of the spire which becomes cylindrical at the last three whorls. It further differs in being more polished, in the striæ being much finer, and in the whorls being less closely coiled; all, except the last whorl, show numerous opaque, narrow, spiral lines. Hanley's figure of the species is very good.

A specimen in the British Museum, from the type-locality, possesses $8\frac{1}{4}$ whorls, but it has the same dimensions as the type.

Major Peile possesses a single specimen from Mahableshwar composed of eight whorls.

350. **Glessula vadalica**, *Benson.*

Achatina vadalica, Benson, A. M. N. H. ser. 3, xv, 1865, p. 15; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 229.
Achatina (Electra) vadalica, Hanley & Theobald, Conch. Ind. 1870, pl. 35, fig. 5.

Stenogyra (*Glessula*) *vadalica*, Nevill, Hand List, i, 1878, p. 168.
Glessula vadalica, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 162; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 64, pl. 9, fig. 11.

Original description:—"A. testa turrito-elongata, striatula, solidula, polita, translucente, luteo-cornea; spira versus apicem convexiusculo-turrita, apice obtusiusculo, sutura impressa; anfractibus 11, convexis, brevibus, superioribus costulato-striatis; ultimo subtus rotundato, $\frac{1}{4}$ longitudinis vix æquante; apertura vix obliqua, elliptico-ovata, marginibus callo junctis, columellari leviter arcuato, albido, oblique truncato, dextro basalique tenuibus.

"Long. 34, diam. 9 mill. Apert., long. 8, lat. 5 mill." (*Benson.*)

Hab. India: Wadale, near Ahmednuggar (*Fairbank*).

"The convex sides of the upper part of the spire, the shorter whorls, with the sculpture and polish of this shell, distinguish it as well from the Nilgiri *A. perrotteti* as from the neighbouring *A. notigena*, which has an attenuate spire and costulate sculpture in all the whorls." (*Benson.*)

In addition to the above differentiating characters, the last whorl of *vadalica* is more tumid at the base, while in *perrotteti* it is more sloping towards the columella.

351. **Glessula tamulica**, *Blanford.*

Achatina tamulica, Blanford, J. A. S. B. xxx, 1861, p. 362; Pfeiffer, Mon. Helic Viv. vi, 1868, p. 232.
Achatina (*Electra*) *tamulica*, Hanley & Theobald, Conch. Ind. 1870, pl. 17, fig. 9.
Stenogyra (*Glessula*) *tamulica*, Nevill, Hand List, i, 1878, p. 168.
Stenogyra (*Subulina*) *tamulica*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 326.
Glessula tamulica, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 162; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 64, pl. 9, fig. 12.

Original description:—"Testa turrita, tenuis, pellucida, nitida, cornea, striatula; spira regulariter attenuata, apice obtusa; anfr. 10 convexi, ultimus $\frac{1}{4}$ longitudinis paulo superans, rotundatus; columella valde arcuata, oblique truncata. Apertura parum obliqua, subovalis; peristoma simplex, tenue, marginibus callo tenuissimo junctis.

"Long. 20, diam. 6 mm. Ap. $5\frac{1}{2}$ alta, 3 lata." (*Blanford.*)

Hab. India: Cullagoody, near Trichinopoli (*Blanford*).

"Near *shiplayi*, Pfr., but distinguished by the smaller number of whorls, more obtuse apex, etc." (*Blanford.*)

Beddome states that Blanford's types, his own specimens received from him, and all other specimens he has seen are not mature, the lip being quite fragile, and he considers it very near *vadalica*, having all the appearance of being the young of that species.

While agreeing with Beddome that its affinity is with *vadalica*, rather than with *shiplayi*, I do not think *tamulica* can be the

immature form of the former, being considerably broader at the base, a feature which would be emphasized if another whorl were added. The later whorls, moreover, increase more rapidly than in *vadalica*, which is more conoid, with straight sides to the spire.

352. **Glessula perrotteti**, *Pfeiffer.*

Achatina perroteti, Pfeiffer, Revue Zool. 1842, p. 305; ibid., Symb. Hist. Helic. ii, 1842, p. 59.
Glandina perroteti, Philippi, Abb. Beschr. Conchyl. i, 1844, p. 135, *Glandina*, pl. 1, fig. 12.
Achatina perrotteti, Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 260; ibid., Conch.-Cab., *Bulimus*, 1860, p. 324, pl. 26, figs. 16, 17.
Achatina (*Subulina*) *perrotteti*, Albers, Die Heliceen, 1850, p. 195.
Oleacina (*Electra*) *perrotteti*, Adams, Gen. Rec. Moll. ii, 1855, p. 106.
Achatina (*Electra*) *perrotteti*, Pfeiffer, Malak. Blätt. ii, 1856, p. 168.
Cionella (*Glessula*) *perroteti*, von Martens, Die Heliceen, ed. 2, 1860, p. 254.
Stenogyra (*Glessula*) *perotteti*, Nevill, Hand List, i, 1878, p. 168, ibid., J. A. S. B. l, 1881, p. 137, pl. 5, figs. 17, 17 *a*.
Glessula perrotteti, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 162; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 65, pl. 9, figs. 9, 10.

Original description:—"Testa elongato-conica, apice obtusiuscula, nitide cornea, diaphana; sutura profunda; anfractibus convexiusculis, ultimo tertiam longitudinis partem æquante; columella valde incurvata, abrupte truncata, apertura ovali.

"Long. 25, diam. 11 mill." (*Pfeiffer.*)

Hab. India: Nilgiris (*Perrottet*); Neddoowutton, Nilgiris (*Blanford*); Pulney Hills (*Beddome*).

353. **Glessula prælustris**, *Benson.*

Achatina prælustris, Benson, A. M. N. H. ser. 3, v, 1860, p. 462; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 221.
Achatina (*Electra*) *prælustris*, Hanley & Theobald, Conch. Ind. 1870, pl. 17, fig. 6; var. fig. 7.
Stenogyra (*Glessula*) *praelustris*, Nevill, Hand List, i, 1878, p. 171.
Glessula prælustris, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 329; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 293; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 162; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 68, pl. 9, figs. 15, 16; Annandale, Rec. Indian Mus. vii, 1912, p. 33.

Original description:—"Testa ovato-oblonga, pertenui, fragili, irregulariter plicato-striata, nitente, pallide luteo-cornea; spira pyramidata, apice obtuso, sutura profundiuscula, subcrenulata; anfractibus $8\frac{1}{2}$ convexiusculis, superna prope suturam tumidiusculis; ultimo $\frac{1}{3}$ testæ superante, subinflato; apertura verticali,

semiovali, latiuscula, columella subrecta, vix curvata, basi oblique truncata, peristomate recto, acuto.

"Long. 33, diam. 17 mill.; apert. 15 mill. longa, 9 lata." (*Benson.*)

Hab. India: Midnapore, Balasore, and Cuttack, prov. Orissa (*Theobald*); Ganjam and Raneegunge (*Ball*, *Stoliczka*); Paresnath Hills, W. Bengal (*Annandale*); Orissa and Ganjam districts, E. Madras (*Beddome*).

354. **Glessula huegeli**, *Pfeiffer.*

Achatina hügeli, Pfeiffer, Symb. Hist. Helic. ii, 1842, p. 58; Philippi, Abb. Beschr. Conchyl. i, 1844, p. 135, *Glandina*, pl. 1, fig. 8; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 259; Reeve, Conch. Icon. v, 1849, *Achatina*, pl. 15, fig. 68; Pfeiffer, Conch.-Cab., *Bulimus*, 1860, p. 334, pl. 29, figs. 2, 3.

Achatina (*Archachatina*) *hügelii*, Albers, Die Heliceen, 1850, p. 190.

Oleacina (*Electra*) *hugeli*, Adams, Gen. Rec. Moll. ii. 1855, p. 105.

Achatina (*Electra*) *hügeli*, Pfeiffer, Malak. Blätt. ii, 1856, p. 168; Hanley & Theobald, Conch. Ind. 1874, p. 33, pl. 78, fig. 2.

Glessula hügeli, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 162; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 91, pl. 9, figs. 13, 14.

Original description:—"T. ovato-turrita, pallide cornea, longitudinaliter striata, nitida, fragili; spira elongata, apice obtusiuscula; sutura profunda; anfr. 10–11 planiusculis, ultimo $\frac{2}{7}$ longitudinis subæquante; apertura oblongo-elliptica; columella valde arcuata; perist. simplice, acuto.

"Long, 37, diam. 13 mill." (*Pfeiffer.*)

Hab. India: Kashmir (*von Hügel*).

When first described its origin was unknown. Kashmir was first given as its habitat by Hanley and Theobald. The species is allied to *G. chessoni*, but it is more solid in texture. The Cuming collection contains three specimens from Kashmir, with a label in Pfeiffer's handwriting.

355. **Glessula burrailensis**, *Godwin-Austen.*

Glessula burrailensis, Godwin-Austen, J. A. S. B. xliv, 1875. p. 3, pl. 1, fig. 6; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 329; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 163; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 92, pl. 7, figs. 9, 10.

Achatina burrailensis, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 277.

Original description:—"Shell turreted elongate, solid, in fresh state brown and lustrous, finely longitudinally striated; whorls 10, rather flat, suture shallow, apex blunt; aperture subvertical, fusiform, angular above, peristome very thick, paler brown on margin, columella strong.

"Alt. 1·37 [=34·75 mm.], major diam. 0·4 inch [=10 mm.]." (*Godwin-Austen.*)

Hab. India: Peak of Khunho, Eastern Burrail Range; Japvo, 7000 ft.

"This species is an extremely elongate solid form of the *crassilabris* section of *Glessula*, and one of the most distinct." (*Godwin-Austen.*)

From *chessoni* it differs apparently in having a more obtuse apex, while from *huegeli* it may be distinguished by the more flattened whorls and the concave upper part of the spire. I have not seen any specimens.

356. Glessula butleri, *Godwin-Austen.*

Glessula butleri, Godwin-Austen, J. A. S. B. xliv, 1875, p. 4, pl. 1, fig. 7; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 163; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 92, pl. 11, figs. 1, 2.

Achatina butleri, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 278.

Original description:— "Shell elongately turreted, very thin and brittle, tumid, pale corneous, glassy, very minutely striated, apex very blunt; whorls 8, rather rounded, suture deep, body-whorl swollen and capacious; aperture vertical, pear-shaped, lip rather thin.

"Alt. 1·13 [=29 mm.], major diam. 0·45 inch [=11·25 mm.]." (*Godwin-Austen.*)

Hab. India: Eastern Burrail Range, 6000 ft.

A species I have not seen. It is apparently rare.

357. Glessula chessoni, *Benson.*

Achatina chessoni, Benson, A. M. N. H. ser. 3, v, 1860, p. 462; Pfeiffer, Mon. Helic. Viv. 1868, p. 222.

Achatina (*Electra*) *chessoni*, Hanley & Theobald, Conch. Ind. 1872, pl. 17. fig. 8.

Stenogyra (*Glessula*) *chessoni*, Nevill, Hand List, i, 1878, p. 167.

Glessula chessoni, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 329; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 163; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 68, pl. 11, fig. 5.

Original description:—"Testa ovato-turrita, superne attenuata, scabre plicato-striata, striis minutissimis confertis obsoletis spiralibus decussata, fulvo-cornea, vel purpureo-fusca, translucente, nitidula; spira turrita, apicem versus obtusiusculum attenuata, sutura impressa, crenulata; anfractibus $11\frac{1}{2}$ convexiusculis, ultimo $\frac{1}{3}$ testæ superante inflatiusculo; apertura subverticali, semiovali, latiuscula, columella subrecta, albido-callosa, basi vix oblique truncata, peristomate recto, tenui." (*Benson.*)

Long. 37, diam. 15 mill.; apert. 14 mill. longa, 8 lata.

Hab. India: Mahableshwar Hills (*Chesson*, *Theobald*); Igatpuri (*Stoliczka*); Torna and Purandhar (*Blanford*, *Fairbank*); North Canara forests and Sircee (*Beddome*).

This species is allied to *G. huegeli* but the spire has a more acuminate apex with concave sides and a broader base; it is also thinner in texture and the suture is more crenulate.

A shell in the Theobald collection, from Mahableshwar, is in very fresh condition and shows rather irregular incised spirals. Three specimens from the same locality, in the Cuming collection, are darker in colour; they measure 30 × 10·5 mm. The Beddome collection contains three shells from Poona, one of which has 11½ whorls and measures 34 × 12 mm., while another possesses 12 whorls and attains a length of 36·5 mm., with a diameter of only 11 mm.

358. Glessula tornensis, *Blanford.*

Glessula tornensis, Blanford, J. A. S. B. xxxix, 1870, p. 22, pl. 3, fig. 22; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 163; Pilsbry, Man. Conch., ser. 2, xx, 1909, p. 69, pl. 11, figs. 3, 4.
Achatina (Electra) tornensis, Hanley & Theobald, Conch. Ind. 1874, pl. 78, fig. 3.
Achatina tornensis, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 278.
Stenogyra (Glessula) tornensis, Nevill, Hand List, i, 1878, p. 167.

Original description :—" Testa ovato oblonga, tenuiuscula, levigata, nitida, polita, sub-obsolete striatula, fulvo cornea; spira elongato conoidea, lateribus convexis; apice valde obtuso; sutura impressa, superne sub-corrugata. Anfr. 7–7½ convexi, ultimus $\frac{3}{5}$ longitudinis superans, subtus rotundatus. Apertura sub-verticalis, oblongo semiovalis; peristoma rectum, tenue, marginibus callo tenui junctis; columella valde arcuata, albescens, antice fere verticaliter truncata.

" Long. 25, diam. 14 mill.; apert. oblique 12 mill. longa, 7 lata." (*Blanford.*)

Hab. India: Torna Hill, Poona (*Evezard, Blanford*); Anamullays, Tinnevelly, and Travancore Ghats (*Beddome*).

" This rather fine species abounds on the hill mentioned, where it has been procured in large numbers by Major Evezard. I only found a few specimens myself. It is amongst the finest of the species of Western India. In form it is remarkably similar to *G. textilis,* W. Blanf., from the Anamullay hills, but it entirely wants the coloured markings of that species." (*Blanford.*)

Beddome observes in connection with the species: " My Travancore specimens were labelled *subtornensis* by Nevill, but I cannot see how they differ. I took a very beautiful dark chocolate-coloured variety on the Calcad Hills in Tinnevelly."

I have been unable to find the Travancore specimens referred to by Beddome, but of three Anamullay shells, labelled *subtornensis,* two undoubtedly pertain to *G. tornensis,* while the third, which differs in several respects, has been made the type of *subtornensis.*

Four specimens from Poona, also in the Beddome collection, range in size from 27 × 13·5 mm. to 26 × 14 mm., while two shells from Torna Hill, in the Theobald collection, measure 26·5 × 14 mm.

359. **Glessula subtornensis**, sp. n.

Shell oblong-conoid, rather thin, translucent, very finely striated, smooth and strongly polished, pale corneous. Spire conoid, with straight sides; suture impressed, subcrenulate; apex rather prominent, very slightly obtuse, almost acute. Whorls 8, scarcely convex, slightly shouldered above, increasing rather slowly and regularly at first, the last three rather suddenly; last whorl nearly equalling in width $\frac{2}{5}$ of the entire length of the shell. Aperture subvertical, broadly truncately semi-oval; peristome scarcely thickened, outer margin scarcely curved and descending nearly vertically, basal margin deeply curved; columella arcuate, forming an obtuse angle at the junction with the parietal wall, very obliquely truncate at the base; the margins united by a thin callus.

Length 26·5 mm., diam. 15 mm.

Hab. India: Anamullays (*Beddome*). Type in the British Museum.

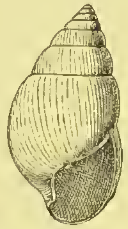

Fig. 122.—*Glessula subtornensis.*

Differs from *G. tornensis* in having a much more acute apex and a broader base; the spire in consequence is acuminate in the upper part instead of convex as in its ally. The earlier whorls are also more closely coiled, and the suture is less distinctly crenulate; finally the shell is less solid and more shining.

I found three shells, labelled *subtornensis*, Nevill, MS., in the Beddome collection. Two of these, however, proved to be simply *tornensis*, while the third has been made the type of the new species.

360. **Glessula textilis**, *Blanford.*

Achatina textilis, Blanford, J. A. S. B. xxxv, 1866, p. 41; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 220.
Achatina (*Electra*) *textilis*, Hanley & Theobald, Conch. Ind. 1870, pl. 17, fig. 10.
Stenogyra (*Glessula*) *textilis*, Nevill, Hand List, i, 1878, p. 168.
Glessula textilis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 329; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 163; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 69, pl. 11, figs. 6, 7.

Original description.—"Shell ovate-oblong, rather solid, translucent, striated near the suture, smooth, polished, dark chestnut

with close vertical and horizontal lines of a greyish-yellow colour, varying in breadth and resembling the threads of an irregularly woven cloth. Spire elongated, conoidal with convex sides, apex obtuse, sutures impressed. Whorls 7, convex, the last about $\frac{2}{5}$ of the entire length, rounded beneath. Aperture vertical, truncately semioval, milky within; peristome slightly thickened, white, right margin slightly sinuate towards the base, columella deeply curved, obliquely truncated beneath, margins united by a thin callus.

"Length 26, diam. 13 millim. Aperture $10\frac{1}{2}$ mill. long, 7 broad." (*Blanford.*)

Hab. India: Anamullay Hills, 6000 ft. (*Beddome, Stoliczka*); Pulney Hills (*Fairbank*); Tinnevelly and Travancore Ghats, South Canara (*Beddome*); Mahableshwar (*Peile*).

"This is the only indigenous Indian *Achatina* with which I am acquainted, possessing coloured markings. In form it approaches some of the Ceylon *Achatinæ*, and also an undescribed Deccan species." (*Blanford.*)

"Varies in diameter from 10 to 14 mm. I have specimens from the Tinnevelly Ghats in which the textile colouring is reduced to a single narrow band on each of the three lower whorls, or is entirely obsolete." (*Beddome.*)

The species is variously ornamented with dark spiral bands and lines, but occasionally specimens occur without either. One shell from South Canara, in the Beddome collection, exhibits some indistinct spiral lines and in addition some opaque transverse lines. Another shell from the Pulney Hills, in the same collection, measures: length 30 mm., diameter 13·5 mm., while two specimens from Tinnevelly are dark fuscous, without bands but with a narrow pale sublateral zone; they consist of $6\frac{1}{2}$ whorls and measure 25·5 × 14 mm.

361. Glessula subserena, *Beddome.*

Glessula subserena, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 166, pl. 15, fig. 7.

Glessula jeyporensis Pilsbry (non Beddome), Man. Conch. ser. 2, xx, 1909, p. 75, pl. 8, figs. 13, 14.

Original description:—"Testa ovato-turrita, solidiuscula, politissima, obsolete striatula, fulvo-cornea, pellucida; spira subturrita, apice obtusato; sutura impressa, marginata, crenulata; anfractus 7 planiusculi, ultimus $\frac{1}{2}$ longitudinis vix æquans; apertura semiovalis; columella valde arcuata, albido-callosa, marginibus callo junctis, ad basin abrupta et oblique truncata.

"Long. 22, diam. 11 mm.; apertura 10 mm. longa, 5 lata." (*Beddome.*)

Hab. India: Peermede (Travancore), Sispara, Nilgiris, S. Canara, and Anamullays (*Beddome*).

"The last whorl is longer, and the spire less elevated than in the Ceylonese *serena*, and the whorls, especially the upper ones, are less convex." (*Beddome.*)

Prof. Pilsbry, in copying Beddome's figures, has unfortunately interchanged the numerals on the plate of the present species and *G. jeyporensis*.

G. subserena is allied to *G. textilis* but is devoid of the spiral bands and lines of the latter.

The Beddome collection contains several shells from the type-locality and two from Sispara, one of which is dark fuscous and a little more conoid than the type; it has 6½ whorls and measures 21 × 11·25 mm. The same collection contains three specimens which were labelled *G. inornata*, from S. Canara, but which pertain to the present species. Of these two, composed of 6½ whorls, measure 20 × 9 mm., while the third, of 7½ whorls, attains a length of 25 mm., with a diameter of 11 mm.

362. **Glessula indica**, sp. n.

Shell oblong-conoid, rather thin, translucent, finely striated, smooth, slightly polished, pale corneous. Spire elongate conoidal, with straight sides, suture rather deep, apex acute. Whorls 9, convex, increasing rather slowly and regularly, last whorl less than ⅖ of entire length. Aperture vertical, truncately semi-oval; peristome slightly thickened, corneous, outer margin regularly curved, columellar margin rather wide, deeply curved, obliquely truncate at the base; margins united by a thin callus.

Length 25·5, diam. 11·5 mm.

Hab. India: Tinnevelly Hills, type (*Beddome*); Anamullay Hills (*Beddome*). Type in the British Museum.

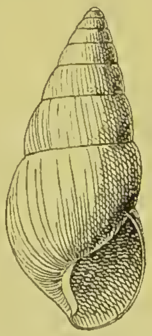

Fig. 123.—*Glessula indica*. 3/2.

This new species is based upon five specimens labelled *G. textilis*, in the Beddome collection (British Museum). It differs from that species in the shell being of a thinner texture, in being smoother but less polished, in the spire having straight sides, and in the apex being more acute. The whorls are also more numerous and more closely coiled, the last whorl being consequently less high in proportion to the entire length of the shell. One of these

shells possesses only eight whorls and measures 20 × 9·5 mm.; it is ornamented with a single, narrow, fuscous, supra-peripheral band below which occur several fuscous spiral lines. The Beddome collection also contains eight specimens from the Anamullay Hills, labelled *G. subserena,* which I refer to the new species. None of these is ornamented with any fuscous spiral bands or lines.

363. **Glessula senator**, *Hanley.*

Achatina (*Glessula*) *senator*, Hanley, P. Z. S. 1875, p. 606.
Achatina senator, Hanley & Theobald, Conch. Ind. 1875, pl. 155, fig. 5; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 616.
Glessula senator, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 163; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 70, pl. 11, fig. 8.

Original description:—"T. subovato-conoidea, nonnunquam angustior, tenuis, nitida, lævigata, chocolati colore tincta, vitta flavescente seu pallida conspicue ornata. Anfractus convexi, multo latiores quam alti (in exemplo imperfecto $6\frac{1}{2}$), celeriter accrescentes, infra suturam valde impressam vitta perangusta, et supra suturam vitta lata (in anfractu ultimo paululum supra medium posita) picti. Spira circiter dimidium testæ occupans; apex pallidior, subito obtusus. [Columella brevis, pallidior, subito obtusus.] Columella brevis, pallida, arcuata, late truncata. "Long. 1 inch." (*Hanley.*)

Hab. India: Cottyam Hills (*Hanley*); Peermede Hills, Travancore (*Beddome*).

The portion of the diagnosis placed in square brackets has evidently crept in through some printer's error and greatly puzzled me at first until this fact dawned upon my mind.

Beddome states that the species only differs from *G. textilis* and *G. tornensis*, both of Blanford, in its beautiful coloration.

Four specimens in the Beddome collection, from Peermede, only differ from *G. textilis* in having a broad pale zone just above the periphery, while some have narrow subsutural lines and a patch on the columella. Hanley's figure of the species is more conoid than these.

364. **Glessula isis**, *Hanley.*

Achatina (*Glessula*) *isis*, Hanley, P. Z. S. 1875, p. 606.
Achatina isis, Hanley & Theobald, Conch. Ind. 1875, pl. 155, fig. 5; Pfeiffer, Mon. Helic. Viv. viii. 1877, p. 616.
Stenogyra (*Glessula*) *isis*, Nevill, Hand List, i, 1878, p. 168.
Stenogyra (*Subulina*) *isis*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 325.
Glessula isis, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 163; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 71, pl. 11, fig. 9.

Original description:—"T. turrito-subcylindracea, lævis, tenuis, nitidissima, albida seu pallida, nonnunquam vitta angusta fulva,

lineis perparvis fulvis confertis circumcincta: vitta variabilis seu sæpius versum basim anfractuum superiorum et supra medium anf. ultimi posita. Anfractus circiter 10, convexi, sensim accrescentes, ad suturam profundam sub lente obsolete subcrenati, multo latiores (ultimo excepto) quam alti: apex obtusus. Apertura angusta, quartam partem totius altitudinis paululum superans. Columella brevis, arcuata, oblique contorto-truncata.

"Long. $1\frac{1}{3}$ poll. [=32 mm.], lat. $\frac{2}{7}$ poll. [=7 mm.]." (*Hanley.*)

Hab. S. India (*Hanley*); Pulney Hills (*Fairbank*, *Beddome*).

"The hair-like lines and narrow fillet seem peculiar to the species: the fillet, however, is neither constant, nor fixed as to position." (*Hanley.*)

According to Beddome *Glessula isis* has much the colouring of *G. textilis*, but the shell is very different in form, being elongated and narrow.

365. **Glessula subperrotteti**, *Beddome.*

Glessula subperrotteti, Beddome, Proc. Malac. Soc. vii, 1906, p. 163, pl. 15, fig. 1; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 71, pl. 8, figs. 1, 2.

Original description:—"Testa ovato-turrita, superne attenuata, nitidissima, leviter plicato-striata, fulvo-cornea; spira turrita, apicem versus obtusiusculum attenuata; sutura impressa, crenulata; anfractus 9, vix convexiusculi, ultimus $\frac{2}{5}$ testæ subæquans; apertura semi-ovalis; columella subrecta, albido-callosa, peristomate recto, tenui, marginibus callo albido junctis.

"Long. 28, diam. 9 mm.; apertura 10 mm. longa, 5 lata." (*Beddome.*)

Hab. India: Travancore Hills, above Calcad.

"Intermediate between *chessoni*, Bens. and *perrotteti*, Pfr. The sculpture is much less prominent than in the former." (*Beddome.*)

The British Museum possesses a specimen, received from the late Colonel Beddome, which is more conoid than the type, since it is only 26·5 mm. long, while the diameter is 10 mm.

366. **Glessula canarica**, *Beddome.*

Glessula canarica, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 164, pl. 15, fig. 4; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 72, pl. 8, figs. 7, 8.

Original description:—"Testa turrito-oblonga, tenuiuscula, spira oblonga, apice obtuso, politissima, purpureo-fusca, distincte et confertim subcostulato-striata, sub lente confertim decussata, sutura impressa, anfractus 9, subplaniusculi, ultimus $\frac{2}{5}$ longitudinis æquans; apertura verticalis, oblongo-semi-ovalis; peristoma tenue; columella valde arcuata, antice fere verticaliter truncata.

"Long. 25, diam. 9 mm.; aperture 8 mm. longa, 4 lata." (*Beddome.*)

Hab. India: South Canara Ghats (Kudra Mukh).

"In its blunt oblong spire it resembles the large form of *amentum* as figured by Hanley. It is a beautifully sculptured shell." (*Beddome.*)

The species is somewhat variable in the length of spire for some shells in the Beddome collection, with a diameter of 9·5 mm., measure 25 mm. in length, while others with the same diameter only attain 23·5 mm.

367. **Glessula anamullica,** *Blanford.*

Achatina anamullica, Blanford, J. A. S. B. xxxv, 1866, p. 37; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 223.
Glessula anamullica, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 329; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 164; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 72.

Original description:—"Shell turrito-ovate, thin, finely striated, horny with high vitreous lustre. Spire turrited, sides convex, apex obtuse, suture impressed. Whorls 8, scarcely convex, the last rounded beneath. Aperture oblique, peristome thin, columella moderately arcuate, obliquely truncated below.

"Length 27, diam. 12 millim. Aperture 10 millimetres high, $6\frac{1}{2}$ broad." (*Blanford.*)

Hab. India: Anamullay Hills and Travancore Hills (*Beddome*).

"Intermediate in character between *A. nilagarica,* Bens. and the oblong ovate *Achatina* of Ceylon." (*Blanford.*)

"Though a good many of this fine dark chocolate-coloured species were taken, none of them had a firm lip, and though eggs taken from some of them, they are probably not full-grown. It is not very like any one species, the nearest to it being *perrotteti.*" (*Beddome.*)

Two specimens in the Hungerford collection in the British Museum are pale corneous, opaque, with narrow spiral bands; while possessing, like the type, eight whorls, they only measure 26·5 × 10·5 mm. Some Travancore specimens, presented in 1906 to the British Museum by the late Colonel Beddome, have the peristome very thin; they consist of $7\frac{1}{2}$ whorls, the largest measuring only 24 × 10 mm. The Beddome collection further contains shells, also from Travancore, composed of eight whorls, and which only measure 26 × 10·5 mm.

368. **Glessula inornata,** *Pfeiffer.*

Achatina inornata, Pfeiffer, P. Z. S. 1851, p. 259; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 490; ibid., Conch.-Cab., *Bulimus,* 1860, p. 322, pl. 26, figs. 8, 9; pl. 37, figs. 1, 2 (*var.*).
Oleacina (*Electra*) *inornata,* Adams, Gen. Rec. Moll. ii, 1855, p. 105.
Achatina (*Electra*) *inornata,* Pfeiffer, Malak. Blätt. ii, 1856, p. 168; Hanley & Theobald, Conch. Ind. 1872, pl. 17, fig. 2, var. fig. 3.
Stenogyra (*Glessula*) *inornata,* Nevill, Hand List, i, 1878, p. 171.

Glessula inornata, Nevill, Enum. Helic. Ceylon, 1871, p. 3; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 329; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 292; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 164; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 58, pl. 6, figs. 10, 11, 14–17.

Original description:—"A. testa turrito-oblonga, solida, confertim striata, pallide fulva, strigis saturatioribus variegata; spira turrita, apice obtusiuscula; sutura lævi, confertissime crenulata; anfractibus 7½, planiusculis, ultimo $\frac{2}{5}$ longitudinis subæquante, basi vix compresso, læviore; columella perarcuata, albo-callosa, oblique abrupte truncata; apertura sinuoso-semiovali, intus alba; peristomate simplice, obtuso, margine dextro repando.

"Long. 28, diam. 11 mill." (*Pfeiffer.*)

Hab. Ceylon (*Layard*); Kandy (*Nevill, Simon*); Matelle East and Ma Ellia (*Layard*). India: South Canara forests (*Beddome*).

Var. **minor**, *Beddome*, l. c. p. 164.

Ceylon (*Beddome*).

369. **Glessula lankana**, *Pilsbry*.

Glessula lankana, Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 54, pl. 7, figs. 1–3.

Original description:—"Shell oblong-turrite, thin but rather solid, yellow or tawny, with some narrow darker or chestnut streaks on the spire. Surface very glossy, finely and deeply striate, the striæ unequal, in places being as narrow as the intervals, but occasionally much wider. Under the compound microscope a very faint spiral striation is visible, the spirals being weakly beaded in places. The first 2½ whorls are smooth. Spire conic with straight sides and obtuse apex. Suture irregularly crenulate. Aperture vertical, flesh-tinted inside. Outer lip obtuse, forming a regular arch. Columella moderately concave, obliquely truncate at base.

"Length 27·2, diam. 11, length ap. 10 mm.; whorls 8⅓.

"Length 27, diam. 11·2, length ap. 10·5 mm.; whorls 8⅓." (*Pilsbry.*)

Hab. Ceylon: Matelle District (*Layard*).

"Closely related to *G. inornata*, but more glossy and having much less distinct microscopic granulation . . . . . The outlines of the spire are straighter; there are more whorls in the same length, and the aperture is smaller. *G. beddomei* has a more prominent and more deeply truncate columella." (*Pilsbry.*)

370. **Glessula subinornata**, *Beddome*.

Glessula subinornata, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 164, pl. 15, fig. 3; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 73, pl. 8, figs. 5, 6.

Original description:—"Testa oblongo-turrita, solida, confertim

striata, striis minutissimis obsoletis spiralibus decussata, fulva, nitida, apice obtusiusculo, sutura leviter impressa, confertissime crenulata; anfractus 8, planiusculi, ultimus $\frac{2}{5}$ longitudinis æquans, convexiusculus; spira elongato-turrita; columella arcuata, albo-callosa, oblique abrupte truncata; apertura triangulari-semiovata, intus albida; peristoma simplex, obtusum.

"Long. 26, diam. 8 mm.; apertura 10 mm. longa, 5 lata." (*Beddome.*)

Hab. India: Sispara Ghat, on the Nilgiris.

"Allied to the Ceylonese *inornata* and *parabilis.* Smaller and narrower than the former; larger and with a more elongated spire than the latter." (*Beddome.*)

Var. **minor,** *Beddome,* l. c. p. 164; Pilsbry, l. c. p. 73.

"Long. 21, diam. 7 mm.; apertura 8 mm. longa, 4 lata. Brumagherry Hills, Wynaad.

"Of a pale steel colour, otherwise only differing in size from the type. Very near *parabilis,* but with a rather longer spire and smaller aperture." (*Beddome.*)

The Beddome collection contains a number of shells labelled "var. *minor.*" They consist of 7½ whorls and measure 21 mm. in length, but with the addition of half a whorl they would equal the type.

371. **Glessula reynelli,** sp. n.

Shell elongate-conoid, rather thin, opaque, a little shining, finely costulate-striate, covered with a thin deciduous cuticle; pale yellowish corneous, here and there marked with dark corneous or fulvous flammules and transverse streaks. Spire

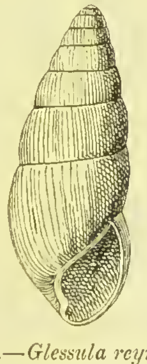

Fig. 124.—*Glessula reynelli.* $\frac{3}{2}$.

convex-conoid; suture rather shallow, crenulated; apex obtuse. Whorls 8, slightly convex, increasing rather rapidly, the last whorl equalling about $\frac{1}{3}$ the entire length of the shell. Aperture

nearly vertical, obovate-pyriform, the margins united by a thin callus on the parietal margin; outer margin gently curved, basal margin arched, columellar margin regularly curved, obliquely truncate.

Length 26, diam. 10·25 mm.; aperture: length 9, width 5 mm.

Hab. Ceylon. Type in the British Museum.

Several specimens presented in 1907 to the British Museum by Mr. H. B. Preston, differ from any known form, and in basing a new species upon them I have much pleasure in dedicating it to a former Secretary of the Malacological Society of London, Mr. Alexander Reynell, who has added considerably to our knowledge of the anatomy of many Mollusca.

The new species is unlike any Ceylon *Glessula* and can only be compared with *G. beddomei*, but that species has a broader base, a concave upper spire, a thicker shell, and is differently coloured, being of a uniform dark fulvous, while the striæ are also coarser and stouter. *G. reynelli* varies considerably in size. One shell composed of 7½ whorls measures 22·5 × 9·5 mm., while another possessing 9½ whorls attains a length of 32·5 and a diameter of 11·5 mm. One specimen, measuring 28 × 11 mm., has a slightly broader base and is not flammulated like the type.

Var. **immitis**, n.

Differs from the type in being dull and lustreless, and in being plicate-striate.

Hab. Ceylon. India: Anamullays.

Two specimens also presented in 1907 by Mr. Preston were labelled *G. inornata*, var., but this form is certainly nearer to *G. reynelli*. A specimen in the Beddome collection, labelled *G. beddomei*, I also refer without hesitation to the present form. Several shells of *G. beddomei* from the Anamullays, in the Beddome collection, were accompanied by a single specimen which, while approaching that species in colouring and length, differs in having a narrower base, a convex apex and finer striæ, characters which induce me to refer the specimen here. It measures 30·5 × 12 mm.

372. **Glessula beddomei**, *Blanford*.

Achatina beddomei, Blanford, J. A. S. B. xxxv, 1866, p. 41; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 222; Hanley & Theobald, Conch. Ind. 1875, pl. 102, fig. 8; 1876, p. 63, pl. 156, fig. 4.
Stenogyra (Glessula) beddomei, Nevill, Hand List, i, 1878, p. 168.
Glessula beddomei, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 329; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 165; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 73, pl. 11, figs. 10, 11.

Original description:—Shell turrito-ovate, solid, finely and closely sub-costulately striated, dark purplish brown, epidermis in

parts having a tendency to assume a dirty cream colour, especially in dead specimens. Spire convex below, slightly acuminate above, apex obtuse, rather inclined to the right, suture impressed. Whorls 7½–8, convex, the last ⅖ of the entire length, rounded at the base. Aperture nearly vertical, sub-pyriform, milky within; peristome thickened, white, outer margin rather straight, not arcuate, columella deeply curved, lined with callus, sub-obliquely and rather broadly truncated at the base.

"Length 30, diam. 11½ millim. Aperture 10 millim. long, 6 broad." (*Blanford.*)

Hab. India: Anamullay Hills, 5000 to 7000 feet (*Beddome*).

"This is a more solid form than any of the Nilgiri species, and it differs from all of them, and also from the solid Ceylonese forms, in its sub-acuminate apex. It is a well-marked species." (*Blanford.*)

Beddome records the species from Ceylon, stating that specimens from that island are slightly narrower but do not otherwise differ. I have not seen any Cinghalese specimens which can be referred to *G. beddomei*, the only specimen so labelled in the Beddome collection being a variety of *G. reynelli* (*q. v.*).

373. **Glessula pallens**, *Beddome.*

Glessula beddomei, var. *pallens*, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 165; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 74.

Shell ovate-conoid, somewhat thin, finely and closely striated, pale straw-coloured with irregular fuscous transverse streaks, variously spaced. Spire convex conoid, suture deep, apex acute.

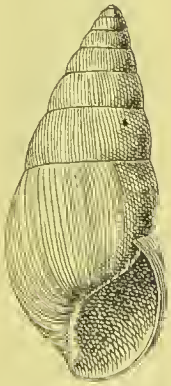

Fig. 125.—*Glessula pallens.* 3/2.

Whorls 8½, convex, the last equalling ⅖ the entire length of the shell, convex at the base. Aperture a little oblique, obovate-pyriform, pearly within, the margins united by a thin callus; peristome scarcely thickened, outer margin regularly curved,

basal margin arcuate, columella deeply arcuate and strongly curving forward, obliquely truncated at the base.

Length 30·5, diam. 13·25 mm.

Hab. Ceylon (*Beddome*). Type in the British Museum.

This form was stated by Beddome to differ from *G. beddomei* only in being of a straw colour, but I find that the spire is not concave near the apex, the shell is more convex in outline, with a broader base, the striæ are more crowded and finer, and the aperture is wider. Under these circumstances I have no hesitation in according this form specific rank. A second specimen has more convex whorls and measures 31·5 × 13·5 mm.

Beddome hazards the opinion that the present form is *G. inornata*, var. β of Pfeiffer *. This statement appears to me to be based on a misconception, for I find a specimen of true *inornata* occurs in the same box with *pallens*.

374. Glessula prestoni, sp. n.

Shell cylindro-conoid, rather solid, opaque, a little shining, finely and closely, irregularly costulate-striate, the striæ sinuous near the suture, with excessively minute spirals in the interstices; a shallow groove, bordered by a few irregular spirals below it, runs parallel with and close to the suture from the beginning of

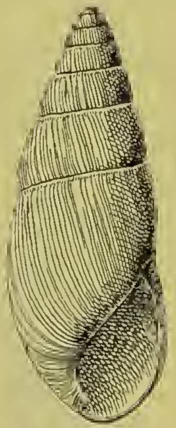

Fig. 126.—*Glessula prestoni*. $\frac{3}{2}$.

the third whorl. Spire convex conoid; suture linear, margined; apex obtuse. Whorls 8, increasing rapidly, flattened, yellowish corneous with fuscous transverse streaks, the last whorl exceeding $\frac{2}{5}$ of the entire length of the shell, subangular at the periphery. Aperture nearly vertical, obovate, margins united by a thin callus on the parietal wall; peristome thickened, outer margin slightly

* Conch.-Cab., *Bulimus*, 1860, pl. 37, figs. 1, 2.

curved, basal margin arcuate, columella truncate, slightly curving forward.

Length 33·5, diam. 13 mm.; apert. 12 mm. high, 5 mm. wide.

Hab. Ceylon. Type in the British Museum.

This species is based upon a single specimen presented to the British Museum in 1907 by Mr. H. B. Preston. Its nearest ally is *G. pallens*, but it may readily be separated from that species since the spire is less conoid, the whorls are less convex, fewer in number, and increase more rapidly, the striæ are less prominent and more crowded, while finally the suture is quite different, being very shallow and margined.

375. **Glessula bollampattiana**, *Hanley* (em.).

Achatina bottampotana (Beddome), Hanley & Theobald, Conch. Ind. 1876, pl. 156, fig. 1.

Stenogyra (Glessula) bottampotana, Nevill, Hand List, i, 1878, p. 168.

Stenogyra (Glessula) bollampattiana, (em.) Nevill, J. A. S. B. l, 1881, p. 139.

Glessula bottampotana, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 293; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 74, pl. 11 fig. 12.

Glessula bolumpattiana, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 165.

Shell ovate-conoid, rather solid, opaque, scarcely shining, finely and closely costulate-striate, the striæ cut into minute granules by intersecting fine wavy spirals, varying from greenish corneous to dark fuscous. Spire conoid, with straight sides; suture shallow, margined; apex acute. Whorls $7\frac{1}{4}$–8, flattened, increasing slowly at first, the last two rather suddenly, the last whorl equalling $\frac{2}{5}$ the entire length of the shell. Aperture little oblique, obovate, the margins united by a distinct callus on the parietal wall; peristome thickened, outer margin slightly curved, basal margin arcuate, slightly curving forward; columella deeply arcuate, obliquely truncate.

Length 22–25, diam. 9·5–10·5 mm.; apert. height 9, width 3·8 mm.

Hab. India: Palghat Hills, Madras; Bollampatty Hill (*Beddome*).

Readily distinguished from all its allies by the finely decussate sculpture, the costulæ being cut into granules by the spirals.

The name of this species has been variously spelt by different authors. The one originally given by Hanley was due to a misreading of the label, and in the amended form it was published in 1881 by Nevill, who stated that Colonel Beddome informed him that it is found on the Bollampatty Hill, near Coimbatore, at 7000 ft., and that the name should be spelt as now given.

The species has never been described and I have drawn up the foregoing diagnosis from a shell in the Beddome collection which agrees fairly with Hanley's figure.

376. **Glessula parabilis**, *Benson.*

Achatina parabilis, Benson, A. M. N. H. ser. 2, xviii, 1856, p. 96; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 606.

Achatina (Electra) parabilis, Hanley & Theobald, Conch. Ind. 1870, pl. 35, fig. 7.

Glessula parabilis, Nevill, Enum. Helic. Ceylon, 1871, p. 3; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 294; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 204; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 54, pl. 7, fig. 4.

Stenogyra (Glessula) parabilis, Nevill, Hand List, i, 1878, p. 171.

Original description: — "Testa oblongo-ovata, solidiuscula, nitida, rugose striata, striis minutissimis obsoletis spiralibus decussata, sub epidermide luteo-cornea albida; spira elongato-conica, apice obtuso, sutura leviter impressa, subcrenulata; anfractibus 6, subplanulatis, ultimo convexiusculo, $\frac{3}{7}$ testæ vix æquante; apertura triangulari semiovata, intus albida; peristomate leviter inflexo, marginibus callo tenui junctis, dextro sinuato, obtusiusculo, columellari perarcuato, oblique valde truncato.

"Long. 20, diam. 10, long. ap. 9, lat. 5 mill." (*Benson.*)

Hab. Ceylon (*Layard, H. Nevill*); Kandy (*G. Nevill*); Maturata (*Simon*).

Hanley & Theobald state this species is near, if not identical with, *A. fusca*, H. Ad.

377. **Glessula fusca**, *Pfeiffer.*

Achatina fusca, Pfeiffer, P. Z. S. 1852, p. 67; ibid., Mon. Helic. Viv. iii, 1853, p. 491; ibid., Conch.-Cab., *Bulimus*, 1863, p. 337, pl. 43, figs. 8, 9.

Oleacina (Electra) fusca, Adams, Gen. Rec. Moll. ii, 1855, p. 105.

Achatina (Electra) fusca, Pfeiffer, Malak. Blätt. ii, 1856, p. 168.

Glessula fusca, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 101, pl. 7, figs. 14, 15.

Original description:—"A. testa oblongo-turrita, tenui, confertissime capillaceo-striata (striis singulis validioribus, variciformibus), sericina, fusca; spira vix curvilineari, apice obtusa; sutura marginata, subtilissime denticulata; anfractibus 7, convexis, ultimo $\frac{3}{7}$ longitudinis æquante, basi rotundato; columella albo-callosa, leviter arcuata, abrupte breviter truncata: apertura verticali, sinuato-semiovali; peristomate simplice, recto.

"Long. 22, diam. 9 mill." (*Pfeiffer.*)

Hab. —?

The present species is included in the Fauna of British India with some doubt, its habitat being unknown. Hanley & Theobald (Conch. Ind. p. 33) considered it near to, if not identical with, *G. parabilis*, but it differs in the much more contracted aperture. The sculpture is rather striking.

378. **Glessula ceylanica**, *Pfeiffer*.

Achatina ceylanica, Pfeiffer, Zeits. Malak. ii, 1845, p. 157; Philippi, Abb. Conch. ii, 1847, p. 214, *Achatina*, pl. 1, fig. 3; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 258; ibid., Conch.-Cab., *Bulimus*, 1860, p. 313, pl. 25, figs. 14, 15.
Achatina (*Electra*) *ceylanica*, Albers, Die Heliceen, 1850, p. 194; Pfeiffer, Malak. Blätt. ii, 1856, p. 168; Hanley & Theobald, Conch. Ind. 1870, pl. 17, fig. 4.
Glandina ceylanica, Morelet, Journ. Conchyl. iii, 1852, p. 34.
Oleacina (*Electra*) *ceylonica*, Adams, Gen. Rec. Moll. ii, 1855, p. 105.
Glessula ceylanica, Nevill, Enum. Helic. Ceylon, 1871, p. 3; Kobelt, Illustr. Conchylienbuch, ii, 1878, p. 276, pl. 85, fig. 6; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 292; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 165; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 57, pl. 6, figs. 7, 8.
Stenogyra (*Glessula*) *ceylanica*, Nevill, Hand List, i, 1878, p. 172; Tryon, Struct. Syst. Conch. iii, 1884, p. 61, pl. 99, fig. 89.

Original description:—"Testa ovato-oblonga, striatula, sericina, tenui, fulvo-cornea; spira pyramidata; apice obtusa; anfr. 7 convexiusculis, ultimo $\frac{3}{7}$ longitudinis aequante, inflato; columella brevi, arcuata, abrupte truncata; apertura latiuscula, semiovali.

"Long. 16, diam. 8 mill." (*Pfeiffer*.)

Hab. Ceylon (*Templeton*, *Layard*); Balapiti and Colombo (*Nevill*); Maturata (*Simon*).

Beddome found some specimens in the Natural History Museum much larger than he ever came across in Ceylon, measuring 30 mm. long by 14 in diameter.

379. **Glessula punctogallana**, *Pfeiffer*.

Achatina ceylanica, Reeve, Conch. Icon. v, 1849, *Achatina*, pl. 15, fig. 59 (*non* Pfr.).
Achatina punctogallana, Pfeiffer, Zeits. Malak. ix, 1852, p. 150; ibid., Mon. Helic. Viv. iii, 1853, p. 493; ibid., Conch.-Cab., *Bulimus*, 1860, p. 323, pl. 26, figs. 14, 15; Hanley & Theobald, Conch. Ind. 1875, pl. 102, fig. 4.
Oleacina (*Electra*) *punctogallana*, Adams, Gen. Rec. Moll. ii, 1855, p. 106.
Achatina (*Electra*) *punctogallana*, Pfeiffer, Malak. Blätt. ii, 1856, p. 168.
Cionella (*Glessula*) *punctogallana*, von Martens, Die Heliceen, ed. 2 1860, p. 254.
Glessula punctogallana, Nevill, Enum. Helic. Ceylon, 1871, p. 3; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 292; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 165.
Stenogyra (*Glessula*) *punctogallana*, Nevill, Hand List, i, 1878, p. 172.
Glessula nitens, var, *punctogallana*, Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 56, pl. 6, figs. 3–5.

Original description:—"T. oblongo-ovata, vix striatula, glabra, nitida, pellucida, corneo-fulva; spira pyramidata, apice obtusa;

anfr. 7½, convexi, ultimus ⅖ longitudinis subaequans, basi rotundatus; columella perarcuata, longe procedens, abrupte truncata; apertura verticalis, subtriangulari-semiovalis; perist. simplex, margine dextro regulariter arcuato.

"Long. 16, diam. 8 mill. Ap. 7 mill. longa, 4 lata." (*Pfeiffer.*)

Hab. Ceylon: Point de Galle (*Benson*); Balapiti (*Nevill*).

Is stated by Pfeiffer to differ from his *H. ceylanica* in having a smoother, more glossy shell with longer spire, shorter last whorl, and in the columella being more arched forward. His figure of *ceylanica* in Conch.-Cab., however, has the last whorl actually less high than *punctogallana*. Beddome was unable satisfactorily to distinguish it from *ceylanica*, except that the latter is generally larger. Pilsbry, on the other hand, reduces *punctogallana* to varietal rank under *G. nitens*. He figures a shell received as *ceylanica* (pl. 6, fig. 5) which he refers to *punctogallana*, but it appears to pertain rather to *nitens*, which has a considerably more elongated spire than the former.

After examining considerable series of both I find they may be readily separated by the character of the columella, which is decidedly shorter in the present species, which, moreover, has the base more contracted, and the whorls more closely coiled. Most of the specimens I have seen labelled *ceylanica* pertain to *punctogallana*.

380. **Glessula nitens**, *Gray.*

Achatina nitens, Gray, Ann. Philos. N. S. ix, 1825, p. 415: ibid., Spicil. Zool. 1830, p. 5 (refers to plate 6. fig. 10, but plate not published); Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 260; Deshayes in Férussac, Hist. Nat. Moll. ii, part 2, 1851, p. 165, pl. 134, figs. 25–27; Pfeiffer, Conch.-Cab., *Bulimus*, 1865, p. 365, pl. 43, figs. 10–12.

Oleacina (Electra) nitens, Adams, Gen. Rec. Moll. ii, 1855, p. 105.

Achatina (Electra) nitens, Pfr. Malak. Blätt. ii, 1856, p. 168; Hanley & Theobald, Conch. Ind. 1870, pl. 17, fig. 1.

Cionella (Glessula) nitens, von Martens, Die Heliceen, ed. 2, 1860, p. 254.

Glessula nitens, Nevill, Enum. Helic. Ceylon, 1871, p. 3; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 165; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 55, pl. 6, figs. 1, 2.

Stenogyra (Glessula) nitens, Nevill, Hand List, i, 1878, p. 171.

Original description:—"Testa ovato-conica, turrita, hyalina, cornea, lævi polita, apice obtusiuscula; anfractibus 8 convexis; apertura ovata, peristomate tenui.

"Axis 7–10 [=17·75 mm.], diam. 3–10 unc. [=7·5 mm.]." (*Gray*, 1825.)

"Shell turreted, shining, pellucid, horn colour; spire conical; apex blunt; whorls 7–8, gradually enlarging, convex. Aperture ¼ the length of the shell, ovate. Columella sharply curved.

"Axis ⅝, diam. ¼ of an inch." (*Gray*, 1830.)

Hab. Ceylon (*Layard, H. Nevill*); Kandy (*G. Nevill*).

G. nitens has a broader base and a shorter columella than *G. panætha*. A shell in the Beddome collection has 7¾ whorls and measures: length 15·5 mm., diameter 8 mm.

In the Beddome collection I also found four shells labelled *G. serena*, but they are undoubtedly *G. nitens*. Their measurements are as follows:—

7½ whorls, length 18·5 mm., diam. 8·5 mm.
8¼ ,, ,, 20·5 mm., ,, 9·5 mm.

The Cuming collection comprises some shells—no habitat recorded—which possess 7½ whorls and measure 18 × 7·5 mm.; they were labelled *botellus* by Beddome, but I do not accept this identification. Some shells, from Hinidun, presented to the British Museum by Mr. H. B. Preston, are pale corneous; these consist of 6 whorls and measure 11·5 × 5·5.

381. **Glessula fulgens**, *Pfeiffer*.

Achatina fulgens, Pfeiffer, Malak. Blätt. v, 1858, p. 238; ibid., P. Z. S. 1859, p. 27; ibid., Mon. Helic. Viv. vi, 1868, p. 225.
Glessula fulgens, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 101.

Original description:—"T. oblongo-ovata, solidula, laevigata, pellucida, nitida, corneo-fulva; spira ovato-conica, apice obtusula; anfr. 6 convexiusculi, ad suturam anguste marginatam striatuli, ultimus 3/7 longitudinis subaequans, basi rotundatus; columella perarcuata, albo-callosa, oblique sublate truncata; apertura verticalis, sinuato-elliptica; perist. rectum, obtusum.

"Long. 12½, diam. 5⅔ mill. Ap. 5½ mill. longa, 3 lata." (*Pfeiffer*.)

Hab. Ceylon: Hinidun (*Preston*).

This species, the habitat of which has hitherto remained

Fig. 127.—*Glessula fulgens*. 3/2.

unknown, is allied to *G. nitens*. Never having been illustrated, I have thought it useful to add a figure of the type in the British Museum.

The late E. L. Layard presented some shells to the British Museum, which consist of 6½ whorls and measure 13·5 × 6·25 mm.

382. Glessula panætha, *Benson.*

Achatina panætha, Benson, A. M. N. H. ser. 3, v, 1860, p. 384; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 226.
Achatina (Electra) panætha, Hanley & Theobald, Conch. Ind. 1870, pl. 36, fig. 2.
Glessula panætha, Nevill, Enum. Helic. Ceylon, 1871, p. 3; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 264 (*panætha*); Beddome, Proc. Malac. Soc. London, vii, 1906, p. 165.
Stenogyra (Glessula) panætha, Nevill, Hand List, i, 1878, p. 171.

Original description:—"Testa ovato-oblonga, tenui, obsolete striatula, nitidissima, pellucida, olivaceo-cornea; spira ad apicem obtusiuscula, lateribus convexiusculis, sutura valde impressa, vix marginata, crenulata; anfractibus $6\frac{1}{2}$ convexiusculis, superne prope suturam breviter convexis, ultimo $\frac{1}{3}$ longitudinis superante ad basin compressiusculo; apertura subverticali, subtriangulari-ovata, peristomate crassiusculo, obtuso, polito, albido, marginibus callo inconspicuo junctis, columellari arcuato, ad basin oblique truncato, intus plica obliqua spiraliter ascendente.

"Long. 13, diam. 6 mill.; apert. 5 mill. longa, 3 lata." (*Benson.*)

Hab. Ceylon: Ellegamme Nalande, Matelle (*Layard*); Ceylon (*Nevill*).

This species approaches *G. nitens*, but it has the last whorl wider and the aperture higher. Some specimens in the Beddome collection are composed of $7\frac{1}{2}$ whorls and measure: length 15 mm., diameter 6·25 mm.

383. Glessula serena, *Benson.*

Achatina serena, Benson, A. M. N. H. ser. 3, v, 1860, p. 384; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 223.
Glessula serena, Nevill, Enum. Helic. Ceylon, 1871, p. 3; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 294; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 166; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 59, pl. 6, fig. 9.
Achatina (Electra) serena, Hanley & Theobald, Conch. Ind. 1874, pl. 78, fig. 8.

Original description:—"Testa ovato-pyramidata, solidiuscula, politissima, obsolete vix striatula, fulvo-cornea, pellucida; spira elongata, subturrita, apice subito obtusato, sutura impressa, submarginata, crenulata; anfractibus $6\frac{1}{2}$–7 subconvexis, superne prope suturam breviter convexis, ultimo ad basin vix compresso; apertura verticali $\frac{3}{7}$ longitudinis æquante, subtriangulari-ovata, peristomate recto obtusiusculo, margine columellari valde arcuato, albido-calloso, ad basin abrupte et oblique truncato.

"Long. 20–21, diam. 9–$9\frac{1}{2}$ mill.; apert. 9 mill. longa, $5\frac{1}{2}$ lata." (*Benson.*)

Hab. Ceylon: Akurambodie, South Matelle (*Layard*).

The shells on which Benson based his species must have been immature, for I find specimens in the Beddome collection of $7\frac{1}{4}$ and $7\frac{3}{4}$ whorls; the former measuring 27×13 mm. and the latter 27×12 mm. A box in the same collection contained four specimens labelled "*lankana*=*inornata*," two of which pertain to the present species, while one is *inornata* and the other *parabilis*!

384. **Glessula sinhila**, *Preston.*

Glessula sinhila, Preston, Rec. Indian Mus. iii, 1909, p. 135, pl. 22, fig. 14; Pilsbry, Man. Conch. ser. 2, xx, 1910, p. 320, pl. 43, fig. 7.

Original description:—"Shell moderately thin, polished, dark yellowish horn colour, obtusely lanceolate; whorls $7\frac{1}{4}$, marked with very faint lines of growth only; sutures impressed; columella descending in a very oblique curve; peristome simple, bent slightly inwards above; aperture inversely, elongately auriform.

"Alt. 21·75, diam. major 9 mm.; aperture, alt. 7·75, diam. 4 mm." (*Preston.*)

Hab. Ceylon (*Preston*).

Mr. Preston compares the present species with *G. inornata*, Pfr., from which, he says, it is easily distinguished by its much more slender form. Judging from the figure it appears to me to be much more nearly allied to *G. serena*, Benson. It has, however, a less attenuated spire than the latter, and is a trifle more cylindrical in shape.

385. **Glessula layardi**, *Pilsbry.*

Glessula layardi, Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 59, pl. 7, figs. 6, 7.

Original description:—"The shell is oblong-turrite, yellow-corneous with profusely scattered whitish dots and spots (produced by disintegration of the surface), paler towards the summit. Surface very glossy, without noticeable microscopic sculpture, but marked with unevenly spaced grooves, which are rather weaker on the last whorl, and obsolete on the base. The summit is obtuse, rounded, first whorls smooth. Whorls $6\frac{1}{2}$, moderately convex. Suture elegantly but somewhat irregularly denticulate. Aperture vertical; outer lip obtuse; columella very short, moderately or deeply concave, subhorizontally and very deeply truncate.

"Length 14, diam. 6, length of aperture 5·9 mm.

"Length 13·5, diam. 6·1, length of aperture 5·9 mm." (*Pilsbry.*)

Hab. Ceylon (*Layard*).

"This species differs from *G. ceylanica* by its very much less deeply concave columella. It is a smaller and more slender shell than *G. serena* which seems to be its nearest ally. The denticulation of the suture is a prominent feature. Though 'live' shells,

the surface is eroded in places. The whitish flecks will probably not be found on shells from stations where they are less liable to erosion." (*Pilsbry*.)

A single specimen of *Glessula layardi*, in the Beddome collection, was labelled *G. amentum*; it consists of $7\frac{1}{2}$ whorls and measures $16{\cdot}5 \times 7{\cdot}5$ mm., while a shell in my own collection has 7 whorls, its dimensions being: length 16, diam. 7 mm.

386. Glessula deshayesi, *Pfeiffer*.

Achatina deshayesi, Pfeiffer, P. Z. S. 1852, p. 86; ibid., Mon. Helic. Viv. iii, 1853, p. 495; vi, 1868, p. 226; ibid., Conch.-Cab., *Bulimus*, 1865, p. 366, pl. 43, figs. 14–16; Hanley & Theobald, Conch. Ind. 1875, pl. 102, fig. 2.
Oleacina (*Electra*) *deshayesi*, Adams, Gen. Rec. Moll. ii, 1855, p. 105.
Achatina (*Electra*) *deshayesi*, Pfeiffer, Malak. Blätt. ii, 1856, p. 168.
Cionella (*Glessula*) *deshayesi*, von Martens, Die Heliceen, ed. 2, 1860, p. 254.
Glessula deshayesi, Nevill, Enum. Helic. Ceylon, 1871, p. 3; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 291; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 166; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 57, pl. 6, figs. 6, 12, 13.

Original description:—" A. testa turrito-ovata, tenuiuscula, sublævigata, nitida, corneo-fusca; spira elongata, convexa, apice obtusula; sutura simplice, subprofunda; anfractibus 7 convexis, ultimo $\frac{2}{5}$ longitudinis subæquante, basi rotundato; columella subtorta, late et oblique truncata; apertura vix obliqua, rhombeo-semiovali; peristomate simplice, obtuso, margine dextro subrepando.

" Long. 11, diam. 5 mill." (*Pfeiffer*.)

Hab. Ceylon: Point Pedro (*Layard*). India: Koondah Mountains, Calicut (*Pfeiffer*).

Pilsbry notes " smaller than *G. nitens*, and of a richer brown colour, but otherwise it is closely related. The whorls are strongly convex and the surface is very brilliant. Some of the post-embryonic whorls are rather distinctly striate. The suture is much less distinctly crenulate than in *G. nitens*, nearly simple. The sides of the spire are slightly convex."

The British Museum possesses three specimens, received from E. L. Layard, from Pt. Pedro, in the extreme north of Ceylon; these have seven whorls and measure 12×6 mm. There are also some specimens in the Cuming collection bearing Pfeiffer's own label; they are from Koondah, Calicut. The base is rather narrow and the shells are of a paler colour than the typical form; they are also composed of seven whorls but, like the type, only measure 11×5 mm.

387. **Glessula pachycheila**, *Benson.*

Achatina pachycheila, Benson, A. M. N. H. ser. 2, xii, 1853, p. 94; Adams, Gen. Rec. Moll. ii, 1855, p. 132; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 608.
Achatina (*Electra*) *pachycheila*, Pfeiffer, Malak. Blätt. ii, 1856, p. 168.
Glessula pachycheila, Nevill, Enum. Helic. Ceylon, 1871, p. 73; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 295; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 166; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 58.
Stenogyra (*Glessula*) *pachycheila*, Nevill, Hand List, i, 1878, p. 172.

Original description:—"Testa ovato-oblonga, striatula, striis exilissimis confertis, obsoletis, spiraliter sub lente decussata, nitida fuscescente-cornea, translucente, spira elongata, subconica, apice obtuso, sutura leviter impressa; anfractibus 6, vix convexiusculis, ultimo $\frac{2}{5}$ longitudinis vix æquante; apertura verticali, oblongo-ovata; peristomate intus albido-marginata, columella præarcuata, margine basali incrassato.

"Axis 11, diam. 5 mill." (*Benson.*)

Hab. Ceylon: Heneratgodde (*Layard*).

"This little species of a group, which has so many representatives in Ceylon, the Nilgherries, and the damp woody mountains of North-eastern India, with a more slender form than *A. oreas*, Nobis, is well distinguished from the allied forms by its peculiar sculpture under the lens, and by the internal incrassation of the peristome, a feature which is also observable in the species *A. crassilabris*, Nobis, from North-eastern India." (*Benson.*)

Beddome states that this species and *G. deshayesi*, Pfr., are closely allied, and often confused in collections, but *G. pachycheila* is a narrower shell than the latter.

Var. **taprobanica**, *Pilsbry*: (subspecies) *l. c.* p. 58, pl. 7, fig. 16.

"Shell smaller, very pale yellow. Sculpture of fine vertical grooves; close on the spire but rather widely, unevenly spaced on the last two whorls; no perceptible spiral lines; two whorls at the summit smooth. Aperture small, the outer lip rather thick; columella moderately concave, subvertically and not very deeply truncate at the base.

"Length 8·5 to 8·8, diam. 3·2, aperture 3 mm.; whorls $6\frac{1}{2}$." (*Pilsbry.*)

Hab. Ceylon: Kandookerre (*Layard*).

388. **Glessula pyramis**, *Benson.*

Achatina pyramis, Benson, A. M. N. H. ser. 3, v, 1860, p. 463; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 226.
Achatina (*Electra*) *pyramis*, Hanley & Theobald, Conch. Ind. 1870, pl. 18, fig. 6.

Glessula pyramis, Godwin-Austen, J. A. S. B. xliv, 1875, p. 3; Nevill, J. A. S. B. xlvi, 1877, p. 26; Nevill in Anderson, Zool. Res. Exp. W. Yunnan, i, 1878, Moll. p. 886; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 166; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 92, pl. 12, fig. 1.
Stenogyra (*Glessula*) *pyramis*, Nevill, Hand List, i, 1878, p. 169; var. *major*, Nevill, op. cit. p. 169.

Original description:—"Testa oblongo-turrita, solidula, lævigata, striatula, nitida, luteo-cornea; spira turrita, lateribus convexiusculis, apice obtusiusculo, sutura impressa; anfractibus 8, convexiusculis, ultimo $\frac{1}{3}$ testæ æquante, antice obsolete plicato; apertura subverticali, elliptico-semiovali, columella arcuata, callosa, basi oblique truncata, peristomate recto obtuso, intus albido-labiato.

"Long. 15, diam. 6 mill.; apert. 5 mill. longa, $2\frac{1}{2}$ lata." (*Benson.*)

Hab. India: Teria Ghat, Khasi Hills (*Theobald*, *Godwin-Austen*). Var. *major*, China: Ponsee, Yunnan (*Anderson*).

This species resembles *G. bensoniana* in shape and general appearance, but although a much smaller shell it has the same number of whorls, which are more closely coiled.

The shell is distantly and irregularly ribbed. There are four specimens in the Theobald collection in the British Museum, from the Khasi Hills, consisting of $8\frac{1}{2}$ whorls, and measuring 14×6 mm.

389. Glessula leptospira, *Benson.*

Achatina leptospira, Benson, A. M. N. H. ser. 3, xv, 1865, p. 14; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 233.
Achatina (*Electra*) *leptospira*, Hanley & Theobald, Conch. Ind. 1870, pl. 35, fig. 2.
Stenogyra (*Glessula*) *leptospira*, Nevill, Hand List, i, 1878, p. 171.
Stenogyra (*Subulina*) *leptospira*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 326.
Glessula leptospira, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 166; Pilsbry, Man. Conch. ser. 2, xx. 1909, p. 65, pl. 12, fig. 2.

Original description:—"A. testa oblongo-turrita, striatula, nitente, pallide fusco-cornea; spira subanguste turrita, apice obtuso, sutura profundiuscula, crenulata; anfractibus 9, convexiusculis, superioribus brevibus convexioribus, ultimo $\frac{1}{3}$ longitudinis non æquante; apertura subobliqua, elliptica, marginibus callo junctis, columellari arcuato, oblique truncato, dextro tenui.

"Long. 16, lat. 6 mill." (*Benson.*)

Hab. India: Soomeysur Hills (*Theobald*).

390. Glessula sisparica, sp. n.

Shell elongate-conoid, translucent, pale fuscous, finely and densely costulate-striate, the striæ slightly flexuous close to the suture. Spire narrow, with straight sides; suture rather deep;

apex acute. Whorls 9, a little convex, slightly gibbous at the upper suture, the last whorl equalling in width $\frac{1}{3}$ of the entire length of the shell. Aperture slightly oblique, pyriform; peristome with acute margins, the callus on the parietal wall scarcely

Fig. 128.—*Glessula sisparica.*

perceptible; upper margin scarcely curved and nearly vertical, basal margin deeply curved; columella slightly arcuate, truncate.

Length 17·75, diam. 5·75 mm.; apert. height 5·5, width 3 mm.

Hab. India: Sispara, Nilgiris (*Beddome*).

Type in the British Museum.

This new species differs from *G. tenuitesta* in having an acute apex, a deeper suture, in the whorls being gibbous at the upper suture, in the last whorl being more sloping behind the columella, and lastly in being distinctly costulate-striate. From *G. leptospira* it may be separated by the straight sides of the spire, the acute apex, and the narrower base. One specimen possesses $9\frac{1}{2}$ whorls, and measures $18{\cdot}25 \times 6$ mm. Two of the earlier whorls appear to have been fractured at an early stage, so that the shell has the spire slightly tilted.

391. **Glessula tenuitesta**, sp. n.

Shell elongate-conoid, pale corneous, thin, translucent, polished, shining, densely covered with minute impressed lines. Spire slightly convex; suture shallow, apex obtuse. Whorls $8\frac{3}{4}$, slightly convex, increasing rather rapidly, the last whorl equalling in width

Fig. 129.—*Glessula tenuitesta.*

nearly $\frac{1}{3}$ of the entire length of the shell, tumid below behind the columella. Aperture a little oblique, broadly obovate; peristome with acute margins, connected by a thin callus on the parietal wall; outer margin slightly curved, basal margin arcuate; columella deeply arcuate, obliquely truncate.

Length 18, diam. 6 mm.; apert. height 5, width 3 mm.

Hab. India: Sispara, Nilgiris (*Beddome*).

Type in the British Museum.

Two specimens, labelled *G. bensoniana*, were found in the Beddome collection, but they differ from that species in having a convex spire, a narrower base and smaller aperture, while the whorls are more narrowly coiled. The new species is allied to *G. leptospira* but it is thinner in texture, smoother and more glossy, and not striated, the whorls are less convex and the last whorl is wider. From the next species it may be separated by the convex spire, the more obtuse apex, the smaller number of whorls which increase more slowly, and the more tumid last whorl. The second specimen is composed of only 8 whorls and measures 13·5 × 5 mm.

392. **Glessula notigena**, *Benson.*

> *Achatina notigena*, Benson, A. M. N. H. ser. 3, v, 1860, p. 462; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 229.
> *Achatina* (*Electra*) *notigena*, Hanley & Theobald, Conch. Ind. 1870, pl. 35, figs. 8, 9.
> *Stenogyra* (*Glessula*) *notigera*, as of Blanford, Nevill, Hand List, i, 1878, p. 167.
> *Glessula notigena*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 166; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 66, pl. 12, figs. 3, 4, 9.

Original description:—"Testa elongato-conica, superne attenuata, tenui, subcostulato-striata, fulvo-cornea, nitida, pellucida; spira turrita, superne attenuata, apiee obtuso, sutura impressa, irregulariter crenulata; anfractibus 9–10 convexiusculis, ultimo $\frac{1}{3}$ testæ non attingente; apertura subverticali, anguste semiovali, columella vix arcuata, subverticali, basi suboblique truncata, peristomate recto, tenui, marginibus callo tenui junctis.

"Long. 20, diam. 7 mill.; apert. 6 mill. longa, vix 4 lata." (*Benson.*)

Hab. India: Mahableshwar Hills (*Chesson*); Poona and Khandala (*Blanford*, *Fairbank*); nr. Bombay (*Theobald*); Sikkim: Darjeeling (*Beddome*).

Three speeimens in the Theobald collection from Mahableshwar, measure 23·5 × 7 mm. Four shells from Darjeeling, in the Beddome colleetion, were labelled *tenuispira*, but I refer these to *notigena*; they measure: length 35, diam. 7·5 mm.

393. **Glessula sarissa**, *Benson.*

> *Achatina sarissa*, Benson, A. M. N. H. ser. 3, v, 1860, p. 463; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 234.
> *Achatina* (*Electra*) *sarissa*, Hanley & Theobald, Conch. Ind. 1870, pl. 35, fig. 10.
> *Stenogyra* (*Glessula*) *sarissa*, Nevill, Hand List, i, 1878, p. 170.
> *Stenogyra* (*Subulina*) *sarissa*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 326.
> *Glessula sarissa*, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 167; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 93, pl. 12, fig. 11.

Original description:—"Testa elongato-conica, tenui, lævigata,

striatula, anfractibus ultimis sub lente confertim obsolete decussatis, nitidissima, olivaceo-cornea; spira elongato-pyramidata, apice obtuso, sutura impressa; anfractibus $9\frac{1}{2}$ convexiusculis, ultimo $\frac{2}{7}$ testæ superante; apertura subverticali, ovato-elliptica, columella obliqua, leviter arcuata, albido calloso, basi oblique truncata, peristomate recto, tenui.

"Long. 16, diam. $5\frac{1}{2}$ mill.; apert. 5 mill. longa, $3\frac{1}{2}$ lata." (*Benson.*)

Hab. India: Comercolly, Banks of Ganges, Bengal (*Cantor*); Ooloobериah, Moisraka, and Jessore District (*Nevill*); Bombay Ghats (*Beddome*).

The figure in Conch. Ind. has considerably larger dimensions, *i. e.* 21 × 8·25 mm., than those indicated by Benson, and it is, therefore, doubtful if the shell represented is identical with Benson's species. I have not seen specimens.

394. **Glessula veruina**, *Benson.*

Achatina veruina, Benson, A. M. N. H. ser. 2, xii, 1853, p. 94; Adams, Gen. Rec. Moll. ii, 1855, p. 132; Pfeiffer, Mon. Helic. Viv. iv, 1859, p. 615.
Achatina (*Subulina*) *veruina*, Pfeiffer, Malak. Blätt, ii, 1856, p. 169.
Stenogyra (*Glessula*) *veruina*, Nevill, Hand List, i, 1878, p. 171.
Stenogyra (*Subulina*) *veruina*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 327.
Glessula veruina, Nevill, Enum. Helic. Ceylon, 1871, p. 3; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 295; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 167; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 60.

Original description:—"Testa cylindraceo-turrita, valde elongata, sordide albida, inæqualiter striata, spira superne sensim attenuata, sutura impressa, crenulata, apice obtuso; anfractibus $12\frac{1}{2}$–13 angustis cylindricis, ultimo $\frac{2}{11}$ longitudinis vix æquante; apertura verticali, truncato-ovali, peristomate recto, acuto, margine columellari leviter arcuato.

"Long. 25, diam. 5 mill." (*Benson.*)

Hab. Ceylon: Nalande (*Layard*).

Fig. 130.—*Glessula veruina.* $\frac{3}{2}$.

I have only seen a single specimen, which is in the Theobald collection, in the British Museum. It is composed of only nine whorls and measures 19 × 4 mm., but it agrees with the

description. As the species has never been illustrated I have thought it advisable to give a figure of this specimen.

The type, unfortunately, appears to have been lost, as it cannot be found in the McAndrew collection at Cambridge.

395. **Glessula hastula**, *Benson.*

Achatina hastula, Benson, A. M. N. H. ser. 3, v, 1860, p. 461; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 235.
Achatina (*Electra*) *hastula*, Hanley & Theobald, Conch. Ind 18.70, pl. 18, fig. 4.
Stenogyra (*Glessula*) *hastula*, Nevill, Hand List, i, 1878, p. 169.
Stenogyra (*Subulina*) *hastula*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 327.
Glessula hastula, Theobald & Stoliczka, J. A. S. B. xli, 1872, p. 334; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 167; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 93, pl. 12, fig. 12.

Original description:—"Testa turrito-subulata, tenui, oblique capillaceo-striata, fusco-cornea, nitidula; spira subulata, apice obtuso, sutura profundiuscula; anfractibus 9, primis convexis, postremis convexiusculis, ultimo $\frac{2}{7}$ testæ vix attingente; apertura vix obliqua, ovato-elliptica, peristomatis marginibus callo tenui junctis, dextrali recto acuto, columellari arcuato calloso albido, basi oblique truncata.

"Long. $12\frac{1}{2}$, diam. $3\frac{1}{2}$ mill.; long. apert. $3\frac{1}{2}$ mill." (*Benson.*)

Hab. India: Pankabari near Darjeeling (*Blanford*). Burma: Kumah Hill and Mai-i, Sandoway District, Arakan (*Theobald & Stoliczka*).

396. **Glessula corrosula**, *Pfeiffer.*

Achatina corrosula, Pfeiffer, P. Z. S. 1856, p. 35; ibid., Novit. Conch. ser. 1, i, 1858, p. 104, pl. 29, figs. 9, 10; ibid., Mon. Helic. Viv. iv, 1859, p. 612.
Achatina (*Electra*) *corrosula*, Hanley & Theobald, Conch. Ind. 1870, pl. 18, fig. 2.
Stenogyra (*Glessula*) *corrosula*, Nevill, Hand List, i, 1878, p. 167.
Stenogyra (*Subulina*) *corrosula*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 326.
Glessula corrosula, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 167; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 67, pl. 12, figs. 5, 6.

Original description:—"A. testa turrita, solidula, sublævigata, punctatim corrosula, pallide cornea; spira convexiusculo-turrita, apice acutiuscula; sutura levi, subcrenulata; anfr. 9 vix convexiusculis, ultimo $\frac{3}{7}$ longitudinis vix æquante, basi rotundato; columella perarcuata, oblique distincte truncata; apertura parum obliqua, sinuato-semiovali; perist. simplice, tenui.

"Long. 15, diam. $6\frac{1}{3}$ mill." (*Pfeiffer.*)

Hab. India: Nilgiris (*Shiplay, Blanford*); Kurnool (*Stoliczka*).

Three specimens in the Cuming collection, from the Nilgiris, measure 14·5 × 4 mm.

397. **Glessula blanda**, sp. n.

Shell elongate-conoid, opaque, rather thin, pale yellow, glossy, very finely striated. Spire narrow, scarcely convex; suture shallow, marginate; apex a little obtuse. Whorls $8\frac{1}{4}$, flattened, increasing slowly at first, the last four rather suddenly, the last whorl equalling in width nearly $\frac{1}{3}$ of the entire length of the shell. Aperture oblique, narrowly obovate, the margins united by a thin callus on the parietal wall; peristome with acute margins; outer margin scarcely curved, basal margin deeply curved; columella arcuate, obliquely truncate.

Length 15·5, diam. 5 mm.; apert., height 5, width 2·5 mm.

Fig. 131.—*Glessula blanda.*

Hab. India: Anamullays (*Beddome*). Type in the British Museum.

Several specimens without name in the Beddome collection were found to pertain to an undescribed form. The new species somewhat resembles a miniature *G. bensoniana*, but the outline is a little more cylindrical, the spire is a little more convex, the apex a little more obtuse, the base narrower, while the shell is more glossy and the striæ are much finer.

A single specimen occurs with narrower base and with more convex whorls. Some of the shells are of a very pale yellow, almost approaching white, while several are dark fuscous, and others again pale fuscous and very translucent.

398. **Glessula bensoniana**, *Pfeiffer.*

Achatina bensoniana, Pfeiffer, Zeits. Malak. viii, 1851, p. 27; ibid., Mon. Helic. Viv. iii, 1853, p. 494; ibid., Conch.-Cab., *Bulimus*, 1860, p. 325, pl. 26, figs. 12, 13.

Oleacina (Electra) bensoniana, Adams, Gen. Rec. Moll. ii, 1855, p. 105.

Achatina (Electra) bensoniana, Pfeiffer, Malak. Blätt. ii, 1856, p. 168.

Stenogyra (Glessula) bensoniana, Nevill, Hand List, i, 1878, p. 167; ibid., J. A. S. B. l, 1881, p. 137, pl. 5, fig. 16.

Glessula bensoniana, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 293; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 167; Pilsbry, Man. Conch., ser. 2, xx, 1909, p. 67, pl. 12, figs. 13, 14.

Original description:—"T. oblongo-subulata, tenuis, vix striatula, nitida, subpellucida, fulvo-cornea; spira subturrita, apice

obtusiuscula; sutura subimpressa, confertim denticulata; anfr. $8\frac{1}{2}$ planiusculi, ultimus $\frac{1}{3}$ longitudinis paulo superans, basi attenuatus; columella leviter arcuata, paulo supra basin aperturæ subsemiovalis breviter truncata; perist. simplex, acutum, margine dextro leviter arcuato.

"Long. 18, diam. $6\frac{1}{3}$ mill." (*Pfeiffer.*)

Hab. India: Nilgiris (*Perrottet*); Anamullays (*Beddome*); Kotagherry and Ootacamund (*Stoliczka*).

Jousseaume attributes this species to Ceylon, quoting Benson as his authority, but, as I have been unable to trace any statement to that effect by Benson, the only possible explanation appears to be that Jousseaume must have confused the species with some other.

The British Museum contains three specimens from Vizagapatam, which were labelled *botellus* by Beddome, but which are undoubtedly forms of *bensoniana*. They have eight whorls, two shells measuring 18·5 × 8 mm., and the third 18 × 8·5 mm.

399. **Glessula tinnevellica**, sp. n.

Shell elongate-conoid, rather solid, more or less opaque, polished, finely costulate-striate, the striæ crossed by excessively fine close spirals, which are more prominent and distinctly incised at the base near the parietal callus. Spire narrow with straight sides; suture superficial, crenulate; apex acute, prominent. Whorls $8\frac{1}{2}$, increasing slowly and regularly, the earlier ones flattened, fulvous

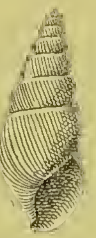

Fig. 132.—*Glessula tinnevellica.* $\frac{3}{2}$.

corneous, the later ones slightly convex, dark chestnut with a pale subsutural narrow band; last whorl equalling in width $\frac{1}{3}$ the entire length of the shell. Aperture oblique, narrowly obliquely pyriform; peristome with acute margins, united by a thin callus on the parietal wall; outer margin descending nearly vertically, basal margin slightly curved, obliquely descending, columellar margin slightly curved elongate.

Length 18, diam. 7 mm.; apert. height 7, width 3 mm.

Hab. India: Tinnevelly (*Beddome*).

Three specimens in the Beddome collection (British Museum), labelled *G. anamullica*, proved quite distinct upon examination, being in fact nearer *G. bensoniana* but differing from the latter in

having a narrower base and more acute apex, a more slender spire, more closely coiled whorls and a subangular periphery. A second specimen has the aperture a little higher and is fuscous above the periphery, dark chestnut below it. A third specimen is greenish corneous, with a yellowish subsutural band, which widens at the penultimate and reaches the periphery on the last whorl.

400. **Glessula travancorica**, sp. n.

Shell elongate-conoid, thin, translucent, fuscous corneous, glossy, very finely and rather regularly striated, the striæ flexuous near the upper suture, while under a strong lens very dense spiral sculpture may be detected. Spire narrow, with straight sides; suture impressed, margined; apex acute, prominent. Whorls $8\frac{1}{4}$, slightly convex, increasing slowly and regularly at first, the last three rather suddenly, the last whorl equalling in width $\frac{2}{7}$ of the entire length of the shell. Aperture oblique, semi-ovate; peristome acute, the margins united by a thin callus on the parietal

Fig. 133.—*Glessula travancorica.*

wall; outer margin slightly curved, basal margin arcuate; columella slightly curved, obliquely truncate.

Length 14, diam. 4·75 mm.; apert.: height 4·5, width 2 mm.

Hab. India: Peermede, Travancore (*Beddome*). Type in the British Museum.

This new species resembles a miniature *G. tinnevellica*, but apart from its much smaller size, the whorls are more convex and more closely coiled, and the last whorl is less tumid. It is also thinner and more translucent. Only four specimens were found in the Beddome collection, two of which are a trifle more conoid than the type, measuring 12 × 5 mm. and 11·5 × 4·75 mm. respectively.

401. **Glessula jeyporensis**, *Beddome.*

Glessula jeyporensis, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 167, pl. 15, fig. 6.

Glessula subserena, Pilsbry (non Beddome), Man. Conch. ser. 2, xx, 1909, p. 75, pl. 8, figs. 11, 12.

Original description:—"Testa oblongo-turrita, tenuis, striatula, nitida, luteo-cornea; spira subturrita, ad apicem obtusa; sutura

impressa, crenulata; anfractus 8 subplaniusculi, ultimus $\frac{2}{5}$ longitudinis fere æquans; columella valde arcuata, ad basim truncata; apertura semi-ovalis; peristoma simplex.

"Long. 18, diam. 6 mm.; aperture 5 mm. longa, 3 lata." (*Beddome.*)

Hab. India: Jeypore Hills.

Said to be "allied to *bensoniana*, but with a shorter, blunter spire." An examination of the type in the British Museum has convinced me that *jeyporensis* bears no resemblance to *bensoniana*, which is a many-whorled species. It is very nearly related to *jerdoni*, but is a little more shining and the whorls are somewhat shouldered near the upper suture. It appears to me, however, to be a doubtful species. Five shells in the Beddome collection, from the type locality, have a somewhat broader base than the type, measuring 17·5 × 7 mm. (7½ whorls).

402. Glessula jerdoni, *Reeve.*

Achatina jerdoni (Benson), Reeve, Conch. Icon. v, 1850, *Achatina*, pl. 21, fig. 80; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 494; ibid., Conch.-Cab., *Bulimus*, 1860, p. 312, pl. 25, figs. 10, 11.
Olcacina (*Electra*) *jerdoni*, Adams, Gen. Rec. Moll. ii, 1855, p. 105.
Achatina (*Electra*) *jerdoni*, Pfeiffer, Malak. Blätt. ii, 1856, p. 168; Hanley & Theobald, Conch. Ind. 1874, pl. 78, fig. 10.
Stenogyra (*Glessula*) *jerdoni*, Nevill, Hand List, i, 1878, p. 168; ibid., J. A. S. B. l, 1881, p. 136, pl. 5, fig. 14.
Glessula jerdoni, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Beddome, Proc. Malac. Soc. London, vii, 1906. p. 168; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 75, pl. 12, figs. 16–18.

Original description:—"Shell somewhat pyramidally oblong, whorls seven to eight in number, convex, smooth polished, finely margined at the sutures, columella arched, conspicuously truncated, aperture small; brown horny." (*Reeve.*)

The following dimensions are given by Pfeiffer (Mon. Helic. Viv. iii, p. 495): "Long. 14, diam. 5 mill. Ap. 4$\frac{2}{3}$ mill. longa, medio 2$\frac{2}{3}$ lata," from Bensonian specimens.

Hab. India: Nilgiris (*Jerdon, Blanford, Nevill*); Pulney Hills (*Fairbank*); Anamullays and Cherra Poonjee (*Beddome*).

403. Glessula singhurensis, *Blanford.*

Glessula singhurensis, Blanford, J. A. S. B. xxxix, 1870, p. 19, pl. 3, fig. 17; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 168; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 76, pl. 10, fig. 5.
Achatina (*Electra*) *filosa*, Hanley & Theobald, Conch. Ind. 1874, pl. 78, fig. 7.

Achatina singhurensis, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 280.

Stenogyra (*Glessula*) *singhurensis*, Nevill, Hand List, i, 1878, p. 166.

Original description :—"Testa pyramidali, turrita, tenuis, cornea, polita, nitida, levis, vix striatula ; spira elongato conica ; apice sub-acuto ; sutura impressa, minute corrugata. Anfr. 8 convexi, ultimus $\frac{1}{3}$ longitudinis vix æquans, subtus rotundatus. Apertura fere verticalis, ovato-oblonga ; peristoma obtusum, albescens ; columella valde arcuata, antice oblique truncata.

"Long. $12\frac{1}{2}$, diam. 4·4, ap. long. 4, lat. $2\frac{1}{2}$ mm." (*Blanford.*)

Hab. India : Singhur near Poona (*Blanford*).

"This is allied to the Nilgiri *G. jerdoni*, Bens., but the sides of the spire are less convex, the shell being more regularly pyramidal with a less obtuse apex. In some of the specimens of this species collected alive, but in which the animal had subsequently dried up, I found young shells. It would thus appear to be viviparous. I have observed the same circumstance (the ocurrence of young inside the old one) in *G. cassiaca*, Bs. In other species of this genus I have found small round eggs with a calcareous shell, but these may be hatched, before they are deposited by the parent." (*Blanford.*)

The Cuming collection in the British Museum comprises five specimens from the type locality, which measure 12 × 4·5 mm. I possess shells from Poona, received from the late Colonel Beddome, which are a little darker in colour than the type and have the apex a little more acute.

G. singhurensis is allied to *G. naja*, Pilsbry, but it is smaller and has the last whorl proportionately higher.

404. Glessula amentum, *Reeve*.

Achatina amentum (Benson), Reeve, Conch. Icon. v, 1849, *Achatina*, pl. 17, fig. 82 : Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 499 ; ibid., Conch.-Cab., *Bulimus*, 1860, p. 311, pl. 25, figs. 4, 5 ; Benson, A. M. N. H. ser. 3, v, 1860, p. 464.

Oleacina (*Electra*) *amentum*, Adams, Gen. Rec. Moll. ii, 1855, p. 105.

Achatina (*Electra*) *amentum*, Pfeiffer, Malak. Blätt. ii, 1856, p. 168 ; Hanley & Theobald, Conch. Ind. 1870, pl. 35, fig. 3.

Cionella (*Glessula*) *amentum*, von Martens, Die Heliceen, ed. 2, 1860, p. 254.

Stenogyra (*Glessula*) *amentum*, Nevill, Hand List, i, 1878, p. 169 ; ibid., J. A. S. B. l, 1881, p. 138, pl. 5, fig. 10.

Glessula amentum, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331 : Beddome, Proc. Malac. Soc. London, vii, 1906, p. 168 ; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 77, pl. 10, figs. 1-4.

Original description :—"Shell cylindrically turreted, very thin, whorls nine in number, rounded, obscurely very finely plicately

striated, columella arched and twisted attenuately truncated; transparent horny." (*Reeve.*)

Pfeiffer supplies the following measurements from specimens sent to him by Benson (Mon. Helic. Viv. iii, p. 499): "Long. 22, diam. 7 mill. Ap. oblique 7½ mill. longa, medio 4 lata."

Hab. India: Howrah near Calcutta (*Reeve, Benson*); Ganjam (*Ball, Beddome*); Orissa (*Beddome*).

"I found the smaller variety very abundant on the top of Myhendra Hill (Ganjam). The larger variety, found near Calcutta and in Central India, and well figered by Hanley, is a rare shell. It has a shorter and blunter apex and fewer whorls than *vadalica*, but specimens of that species sometimes do duty for it in collections." (*Beddome.*)

The "smaller variety," referred to by Beddome, is quite a distinct form on which I have based the next species.

405. **Glessula ganjamensis**, sp. n.

Shell cylindrico-conoid, opaque, rather solid, a little shining, finely and closely striated under a greenish or yellowish deciduous cuticle, the striæ slightly flexuous near the upper suture. Spire convex; suture impressed, crenulate; apex obtuse. Whorls 7, slightly convex and somewhat gibbous at the upper suture, the last whorl equalling in width about ⅓ of the entire length of the shell. Aperture nearly vertical, sub-ovate; peristome a little thickened, parietal callus scarcely perceptible; outer margin slightly curved, basal margin deeply curved; columella deeply arcuate, obliquely truncate.

Length 16·25, diam. 7 mm.; apert.: height 6, width 3·5 mm.

Fig. 134.—*Glessula ganjamensis.*

Hab. India: Myhendra Hill, Ganjam (*Beddome*).

Type in the British Museum.

This is the form referred to by Beddome as "the smaller variety [of *G. amentum*] very abundant on the top of Myhendra Hill." It is, however, quite distinct from *G. amentum*, being not only considerably smaller but more solid, with a more convex spire, a less obtuse apex, a more tumid and relatively higher last whorl, and a narrower aperture. The cuticle appears to be rather deciduous and many specimens have the apex corroded. One specimen with 8 whorls measures 17 mm. in length. Another

shell, composed of 7½ whorls, only attains 14·75 mm. in length with a diameter of 5·25 mm.

406. **Glessula facula**, *Benson.*

Achatina perrotteti, Reeve, Conch. Icon. v, 1850, *Achatina*, pl. 21, fig. 102 (non Pfr.).
Achatina facula, Benson, A. M. N. H. ser. 3, v, 1860, p. 466; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 224.
Achatina (*Electra*) *facula*, Hanley & Theobald, Conch. Ind. 1870, pl. 35, fig. 1.
Stenogyra (*Glessula*) *facula*, Nevill, J. A. S. B. l, 1881, p. 137, pl. 5, fig. 18.
Glessula facula, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 168; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 77, pl. 10, figs. 8, 9.

Original description:—"Testa turrito-ovata, tenui, lævigata, irregulariter striatula, translucente, nitida, pallide fulvo-cornea; spira turrito-conica, apice obtuso, sutura profundiuscula, irregulariter vix crenulata; anfractibus 7½, subconvexis, ultima $\frac{2}{5}$ testæ vix attingente, antice leviter remote plicato-striato; apertura subverticali, semiovali, columella breviter valde arcuata, callosa, basi oblique truncata, peristomate recto, tenui, marginibus callo tenui junctis.

"Long. 18, diam. 8 mill.; apert. 7 mill. longa, 4½ lata." (*Benson.*)

Hab. India: Nilgiri Hills (*Jerdon*); Pulney Hills (*Nevill*); Kurnool, Anamullay Hills, and Jeypore Hills (*Beddome*).

407. **Glessula illustris**, *Godwin-Austen.*

Glessula illustris, Godwin-Austen, J. A. S. B. xliv, 1875, p. 3, pl. 1, fig. 5; ibid., xlv, 1876, p. 315; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 168; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 95, pl. 11, figs. 13-16.
Achatina illustris, Hanley & Theobald, Conch. Ind. 1875, pl. 102, fig. 9; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 279.
Stenogyra (*Glessula*) *illustris*, Nevill, Hand List, i, 1878, p. 170.

Original description:—"Shell elongately oval, greenish horny, finely striated longitudinally; whorls 7, very slightly rounded, suture moderately impressed, the lip thickened, columellar margin slightly curved and strong, apex blunt.

"Length 0·75 [=19 mm.], major diam. 0·3 [=7·5 mm.]; length of aperture 0·3 inch [=7·5 mm.]." (*Godwin-Austen.*)

Hab. India: Hengdan Peak, N. Cachar Hills, 7000 ft.; Nenglo, 6000 ft.; Luka Valley, Jaintia Hills, 1000 ft. (*Godwin-Austen*).

"This species is an elongate and larger form of *Glessula crassilabris*, of which *G. pyramis* is a closer variety, but its much more elongate form and stronger striation make it a good connecting

species with *G. butleri* described further on. The form from the Luka Valley is a tumid departure from the type figured. One specimen measures: alt. 0·75 [=19 mm.), major diam. 0·38 inch [=9·25 mm.], another 0·65 [=16·25 mm.], major diam. 0·35 inch [=9 mm.].

"I look on all these species as properly varieties, and *G. crassilabris*, very abundant in all the grass country of the Khasi Hills, may be taken as the type; a difference in elevation and conditions of habitat, from damp dark forest to hot grassy slopes, having produced modifications of form."

Pilsbry points out that in *G. illustris the embryonic whorls are closely and finely striate vertically* as in *G. notigena* and that hence it has no affinity to *G. crassilabris*. He continues: "It is a much less robust shell and less polished; and on the last whorl there are traces of fine spiral striation, as shown in fig. 13. The sculpture of the later whorls is irregular; there seem to be unequally separated grooves, with finer striæ and grooves in the intervals, but quite unequally developed. The suture is crenulate. On the last whorl or two some traces of spiral striæ appear in places. The outer lip is a little sinuous, being retracted above; it is moderately thickened or obtuse."

Beddome was unable to distinguish this species in any way from *G. facula*, but the latter has the whorls much more closely coiled.

A specimen from N. Cachar, in the Beddome collection, composed of seven whorls, measures only 16 mm. in length and 7 mm. in diameter.

408. Glessula botellus, *Benson.*

Achatina botellus, Benson, A. M. N. H. ser. 3, v, 1860, p. 465; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 226.
Achatina (Electra) botellus, Hanley & Theobald, Conch. Ind. 1870, pl. 35, fig. 4.
Stenogyra (Glessula) botellus, Nevill, Hand List, i, 1878, p. 168.
Glessula botellus, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 168; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 78, pl. 10, fig. 6.

Original description:—"“Testa oblonga, solidiuscula, lævigata, leviter striatula, sub lente indistincte confertim, spiraliter, minutissime acuducta, polita, fulvo-castanea; spira ovato-oblonga, apice valde obtuso, sutura impressa, leviter crenulata: anfractibus 7 convexiusculis, ultimo vix latiore; apertura subobliqua, semiovali, intus albida, columella valde arcuata, albido-callosa, basi subverticaliter truncata, peristomate recto, marginibus callo tenui junctis, dextrali latiusculo, planato, non incrassato." (*Benson.*)

Long. 18, diam. 7½ mill.; apert. 7 mill. longa, 3⅔ lata.

Hab. India, Nilgiri Hills (*Jerdon*); Pykara, Nilgiris (*Blanford*).

This species is characterized by the flattened whorls and

shallow suture. It resembles *G. subperrotteti*, but is more polished, the suture is not margined, and the base is narrower.

Some specimens from the Nilgiris in the Beddome collection were labelled *G. facula*, but I refer them without hesitation to *G. botellus*; one composed of 7¼ whorls, measures 19·5 × 8 mm. Three shells from Pegu, in the Theobald collection, are composed of seven whorls, and measure 16 × 7 mm.

409. **Glessula orophila**, *Reeve*.

Achatina orophila (Benson), Reeve, Conch. Icon. v, 1849, *Achatina*, pl. 19, fig. 105; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 493 (as synonym of *A. ceylanica*, Pfr.); Benson, A. M. N. H. ser. 3, v, 1860, p. 465.

Oleacina (*Electra*) *orophila*, Adams, Gen. Rec. Moll. ii, 1855, p. 106.

Cionella (*Glessula*) *orophila*, von Martens, Die Heliceen, ed. 2, 1860, p. 254.

Stenogyra (*Glessula*) *orophila*, Nevill, J. A. S. B. l, 1881, p. 137, pl. 5, fig. 19.

Glessula orophila, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 168; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 79, pl. 10, fig. 10.

Original description:—"Shell conically ovate, spire acuminated, sutures impressed, whorls seven in number, rounded, peculiarly obscurely indented, columella short, deeply arched and truncated, aperture rather small; olive-horn.

"Distinguished by the deeply arched curvature of the columella, and by the whorls being rather more numerous than is usual in species of this form." (*Reeve.*)

Hab. India: Mahableshwar, Anamullays, and S. Canara (*Beddome*). Burma: Pegu (*Theobald*).

No measurements are given by Reeve, but three specimens from Mahableshwar, in the Beddome collection, possessing 7½ whorls, measure 18 × 9·5 mm.; the same collection contains numerous shells from South Canara and the Anamullays, composed of eight whorls, and measuring 18 × 9 mm. The Theobald collection comprises five shells from Pegu, one of which has nine whorls and measures: length 21·75 mm., diameter 10 mm.

Many of the specimens I have seen distinctly show incised lines, evenly spaced.

410. **Glessula arthuri**, *Benson*.

Achatina arthuri, Benson, A. M. N. H. ser. 3, xiii, 1864, p. 209; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 224.

Achatina (*Electra*) *arthuri*, Hanley & Theobald, Conch. Ind. 1870, pl. 36, fig. 3.

Stenogyra (*Glessula*) *arthuri*, Nevill, Hand List, i, 1878, p. 167.

Glessula arthuri, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881 p. 330; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 168; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 79, pl. 10, fig. 7 (as synonym of *G. orophila*).

Original description:—" A. testa ovato-conica, irregulariter plicato-striata, luteo-fulva, polita, translucente; spira ovato-conica, apice obtuso, sutura impressa; anfractibus $7\frac{1}{2}$, convexiusculis, prope suturam subcrenulatis; apertura subverticali, elliptico-ovata; peristomate crassiusculo, callo parietali infra albido; margine columellari oblique truncato.

" Long. 19, diam. 10, apert. long. 8 mill." (*Benson.*)

Hab. India: Neher, Mahableshwar (*A. E. Benson*, *Fairbank*, *Blanford*).

Beddome believed this species to be identical with *G. orophila*, and Pilsbry placed it under the synonymy of the latter, but, although closely allied, I consider the two sufficiently distinct, being readily distinguished from *G. oriphila* by the absence of impressed transverse striæ, in being costulate-striate and less shining. I have seen two shells from Mahableshwar in Major Peile's collection, while a single specimen, without habitat, in the Theobald collection, possesses eight whorls and measures: length 22 mm., diam. 12 mm.; it accords well with Blanford's description and Hanley's figure. No habitat was recorded. There were besides several other shells labelled "*arthuri*," but these all pertain to *orophila*.

411. Glessula oreas, *Reeve*.

Achatina oreas (Benson), Reeve, Conch. Icon. v, 1850, *Achatina*, pl. 21, fig. 113; Benson, A. M. N. H. ser. 3, v, 1860, p. 464.
Oleacina (*Electra*) *oreas*, Adams, Gen. Rec. Moll. ii, 1855, p. 105.
Electra oreas, Frauenfeld, Verh. K.K. Zool.-Bot. Ges. xix, 1869, p. 873.
Achatina (*Electra*) *oreas*, Hanley & Theobald, Conch. Ind. 1874, p. 33, pl. 78, fig. 9.
Stenogyra (*Glessula*) *oreas*, Nevill, J. A. S. B. l, 1881, p. 135, pl. 5, fig. 11.
Glessula oreas, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 169; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 80, pl. 10, fig. 11.

Original description:—" Shell oblong-conical, whorls seven in number, convex, finely margined at the sutures, longitudinally obscurely impressly striated, columella arched, aperture small; brown horny." (*Reeve.*)

The following dimensions are given by Nevill (J. A. S. B. l, p. 135) from a Travancore specimen he received from Beddome: " Long. $14\frac{1}{2}$, diam. $7\frac{1}{4}$ mill."

Hab. India: Nilgiri Hills (*Jerdon*); Tinnevelly and Travan-

core Hills, South Canara Ghats, Nullamullays, and Kurnool (*Beddome*).

Beddome thought *Glessula paviei*, Morlet, from Tonkin was identical with the present species, but the former has one whorl more and is considerably more slender.

Some shells from Travancore in the Beddome collection, composed of seven whorls, measure: length 14 mm., diam. 7 mm., while others from the Anamullays, also possessing seven whorls, only attain a length of 13 mm. and a diameter of 6·5 mm. The same collection contains specimens from Kurnool, possessing seven whorls and measuring 12·75 × 6 mm. One of these had the aperture closed by an opaque epiphragm, and contained five spherical eggs.

412. **Glessula pseudoreas**, *Nevill.*

Achatina oreas, Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 495; ibid., Conch.-Cab., *Bulimus*, 1860, p. 312, pl. 25, figs. 8, 9 (not *A. oreas* (Bens.), Reeve).

Stenogyra (*Glessula*) *oreas*, Nevill, Hand List, i, 1878, p. 168.

Stenogyra (*Glessula*) *pseudoreas*, Nevill, J. A. S. B. l, 1881, p. 136; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 169; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 80, pl. 10, figs. 12, 13.

Glessula oreas, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330.

Glessula pseudoreas, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 169; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 80, pl. 10, figs. 12, 13.

Original description:—"T. subturrito-ovata, tenuis, lævigata, parum nitida, fusco-cornea; spira turrito-conica, apice obtusa; sutura submarginata, impressa; anfr. 7 vix convexiusculi, ultimus $\frac{2}{5}$ longitudinis subæquans, basi rotundatus; columella perarcuata, albo-callosa, supra basin aperturæ elliptico-semiovalis oblique truncata; perist. rectum, acutum, margine dextro leviter arcuato.

"Long. 12½, diam. 5 mill., ap. 5 mill. longa, medio 2½ lata." (*Pfeiffer.*)

Hab. India: Nilgiris (*Jerdon, Blanford*); S. Canara Ghats and Tinnevelly Hills (*Beddome*).

"Nilgiri specimens collected by Mr. Blanford (which I take for my type) measure—long. 11, diam. 5 (vix) mill. and are of six whorls only." (*Nevill.*)

Var. **subdeshayesiana**, *Nevill*, l. c. p. 136; Pilsbry, l. c. p. 80.

"Anfr. 6; long. 11, diam. 4½ mill. Type var. from the Anamullays (*Beddome*); also from the Pulney Hills (*Fairbank*)." (*Nevill.*)

413. **Glessula crassilabris**, *Benson.*

Achatina crassilabris, Benson, J. A. S. B. v, 1836, p. 353; Pfeiffer, Mon. Helic. Viv. ii, 1848, p. 261; Reeve, Conch. Icon. v, 1850, *Achatina*, pl. 21, fig. 81; Pfeiffer, Conch.-Cab., *Bulimus*, 1860, p. 313, pl. 25, figs. 12, 13; Benson, A. M. N. H. ser. 3, v, 1860, p. 464 (small var.); Blanford, J. A. S. B. xxxiv, 1865, p. 95 (dwarf var. 11×6 mm.).
Oleacina (*Electra*) *crassilabris*, Adams, Gen. Rec. Moll. ii, 1855, p. 105.
Achatina (*Electra*) *crassilabris*, Pfeiffer, Malak. Blätt. ii, 1856, p. 168; Hanley & Theobald, Conch. Ind. 1870, pl. 36, fig. 1.
Cionella (*Glessula*) *crassilabris*, Martens, Die Heliceen, ed. 2, 1860, p. 254.
Stenogyra (*Glessula*) *crassilabris*, Nevill, Hand List, i, 1878, p. 170.
Glessula crassilabris, Godwin-Austen, J. A. S. B. xlv, 1876, pp. 3, 315; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330: Beddome, Proc. Malac. Soc. London, vii, 1906, p. 169; Pilsbry, Man. Conch. ser. 2, xx, p. 96, pl. 10, figs. 14, 15.

Original description:—"Testa turrito-conica, lævi, cornea, longitudinaliter striata; anfractibus convexis, suturis excavatis; labro intus incrassato; columella præarcuata; apice obtuso.

"Long. 0·7 [=17·75 mill.], lat. 0·3 poll. [=7·75 millim.]." (*Benson.*)

Hab. India: Sylhet (*Benson*); Khasi Hills (*Mainwaring*); Teria Ghat (dwarf var. *Theobald*); Darjeeling (*Stoliczka*); Shengorh and Toruputu, Dafla Hills, Naga Hills (*Godwin-Austen*). Burma: Arakan (small var. *Blanford*).

"This shell has the habit of a Ceylon species, which I believe to be *A. nitens* of Gray. It differs in greater size, in its incrassated outer lip, in its somewhat more ventricose form, and its sculpture." (*Beddome.*)

414. **Glessula naja**, *Pilsbry.*

Glessula naja (Blanford), Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 90, pl. 12, fig. 10.

Original description:—"Shell slender, turrite, thin, yellow-corneous, glossy, weakly striulate, and having vertical grooves at unequal intervals; this sculpture is most evenly developed just below the suture. Under the compound microscope glimpses of excessively weak, close spiral granule-lines may be seen in places. Outlines of the spire nearly straight, a trifle contracted near the apex. Whorls $9\frac{1}{4}$, moderately convex, separated by a deeply impressed simple suture. Aperture a little oblique; outer lip thin; columella rather long, regularly concave, truncate at the base.

"Length 19, diam. 6·6, length of aperture 6·5 mm." (*Pilsbry.*)

Hab. India: Assam (*Nevill*).

"The later whorls are decidedly longer than in *G. tenuispira*

and its immediate allies. The specimens were received from Nevill under the name used above; they may possibly be *Glessula*, No. 80 of his Hand List, since they seem related to *G. subfusiformis*." (*Pilsbry.*)

415. **Glessula orobia**, *Benson.*

Achatina orobia, Benson, A. M. N. H. ser. 3, v, 1860, p. 461; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 224.
Achatina (Electra) orobia, Hanley & Theobald, Conch. Ind. 1870, pl. 18, fig. 7; var. fig. 8.
Stenogyra (*Glessula*) *orobia*, Nevill, Hand List, i, 1878, p. 170.
Glessula orobia, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 169; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 96, pl. 10, fig. 16.

Original description:—"Testa ovato-oblonga, solidiuscula, lævigata, leviter striata, striis nonnullis remotiusculis profunde impressis sculpta, nitida, olivaceo-cornea; spira convexe pyramidata, apice obtuso, sutura impressa; anfractibus $6\frac{1}{2}$–$7\frac{1}{2}$ convexiusculis, ad humerum angulatis, crenulatis, ultimo $\frac{1}{3}$ testæ superante; apertura verticali semiovali, columella valde arcuata, callosa, basi oblique truncata, peristomate recto, crassiusculo, obtuso.

"Long. 11, diam. 5 mill.; apert. 4 mill. longa, 3 lata." (*Benson.*)

Hab. India: Sinchul and Darjeeling (*Blanford*); Naga Hills (*Beddome*).

Some specimens in the Beddome collection, from the Naga Hills, composed of $6\frac{1}{2}$ whorls, measure 8 × 3·5 mm. Another shell, possessing only six whorls, is rather convex, measuring 6·5 × 3 mm.

416. **Glessula scrutillus**, *Benson.*

Achatina scrutillus, Benson, A. M. N. H. ser. 3, v, 1860, p. 463; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 227.
Achatina (*Electra*) *scrutillus*, Hanley & Theobald, Conch. Ind. 1870, pl. 18, fig. 1.
Stenogyra (*Glessula*) *scrutillus*, Nevill, Hand List, i, 1878, p. 170.
Glessula scrutillus, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 169; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 81, pl. 10, fig. 17.

Original description:—"Testa oblonga, solidiuscula, lævigata, subremote striatula, nitidula, fulvo-cornea; spira ovato-oblonga, apice obtuso, sutura impressa; anfractibus $5\frac{1}{2}$ convexiusculis, ultimo $\frac{1}{3}$ testæ superante; apertura verticali, ovato-elliptica, columella valde arcuata, basi subito et profunde truncata, peristomate recto, obtuso, marginibus callo crassiusculo junctis.

"Long. 6 mill., diam. $2\frac{2}{3}$; long. apert. $2\frac{1}{2}$ millim." (*Benson.*)

Hab. India: Cuttack, prov. Orissa, and upper valley of the Nerbudda (*Theobald*).

Allied to *G. gemma*, but more cylindrical, with a convex spire. A specimen in the Theobald collection, from the Nerbudda Valley, with six whorls, measures 5·5 × 2·75 mm. Another shell from Malabar, having 6½ whorls, has the following dimensions: length 7 mm., diameter 3 mm.

417. **Glessula gemma**, *Reeve.*

Achatina gemma (Benson), Reeve, Conch. Icon. v, 1850, *Achatina*, pl. 22, fig. 123; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 496; ibid., Conch.-Cab., *Bulimus*, 1860, p. 314, pl. 25, figs. 24, 25; Benson, A. M. N. H. ser. 3, v, 1860, p. 464 (large var.).
Oleacina (Electra) gemma, Adams, Gen. Rec. Moll. ii, 1855, p. 105.
Achatina (Electra) gemma, Pfeiffer, Malak. Blätt. ii, 1856, p. 168; Hanley & Theobald, Conch. Ind. 1870, pl. 36, fig. 7.
Cionella (Glessula) gemma, von Martens, Die Heliceen, ed. 2, 1860, p. 254.
Stenogyra (Glessula) gemma, Nevill, Hand List, i, 1878, p. 170.
Glessula gemma, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Kobelt, Illustr. Conchyl. Buch, ii, 1878, p. 276, pl. 85, fig. 7; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 169; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 97, pl. 13, figs. 1, 3.

Original description:—"Shell oblong-conical, rather solid, whorls six in number, rounded, smooth, columella arched, abbreviated, aperture nearly round; purple-black, shining." (*Reeve.*)

"Of a much darker purple-black colour than any other of the Indian species, and of shorter growth, with a shining, polished surface." (*Reeve.*)

Hab. India: Barrackpore (*Benson*); Chandpore (*Bacon*); Jessore District, Chandbally, and Moisraka (*Nevill*); Rajmahal (*Raban*); Chandernagore (*Mainwaring*); Garo Hills (*Godwin-Austen*); Malabar plains and Beypur (*Beddome*). Burma: Chittagong (*Raban*); Arakan (*Kurz*).

The following measurements are supplied by Pfeiffer from specimens in his own collection (Mon. Helic. Viv. iii, p. 496):—"Long. 8½, diam. 4 mill., ap. 3 mill. longa, 2 lata," while Benson (A. M. N. H. ser. 3, v, p. 464) indicates a large variety, 8 × 3½ mm.

It is allied to *G. scrutillus*, but that species is more cylindrical with a convex spire. A specimen in the British Museum of 5¾ whorls measures 6 mm. in length.

Var. frumentum, *Reeve.*

Achatina frumentum, Reeve, Conch. Icon. v, 1850, *Achatina*, pl. 22, fig. 124; Deshayes, in Férussac, Hist. Nat. Moll. ii, part 2, 1851, p. 169, pl. 134, figs. 22-24.
Achatina gemma, var. *frumentum*, Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 496.
Oleacina (*Electra*) *frumentum*, Adams, Gen. Rec. Moll. ii, 1855, p. 105.
Cionella (*Glessula*) *gemma*, var. *frumentum*, von Martens, Die Heliceen, ed. 2, 1860, p. 254.
Glessula gemma, var. *frumentum*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 98, pl. 13, fig. 2.

The whorls are less rounded, less polished, and of a uniform lighter colour than in the type.

Hab. India: Chandpore, Bengal (*Bacon*).

This is generally paler than the type, the whorls are less numerous, and the spire is more conoid.

The British Museum contains five specimens, labelled "Chandpore"; they are composed of six whorls and measure 6·5 × 3·1 mm.

418. Glessula crassula, *Reeve.*

Achatina crassula (Benson), Reeve, Conch. Icon. v, 1850, *Achatina*, pl. 22, fig. 120; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 496; ibid., Conch.-Cab., *Bulimus*, 1860, p. 314, pl. 25, figs. 16, 17.
Oleacina (*Electra*) *crassula*, Adams, Gen. Rec. Moll. ii, 1855, p. 105.
Achatina (*Electra*) *crassula*, Pfeiffer, Malak. Blätt. ii, 1856, p. 168; Hanley & Theobald, Conch. Ind. 1870, pl. 36, fig. 4.
Stenogyra (*Glessula*) *crassula*, Nevill, Hand List, i, 1878, p. 169.
Glessula crassula, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 169; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 98, pl. 13, fig. 4.

Original description:—"Shell pyramidally conical, whorls seven in number, flatly convex, longitudinally impressly striated, sutures excavated, columella arched, conspicuously truncated, aperture small; whitish, covered with an olive horny epidermis." (*Reeve.*)

Hab. India: Himalayas (*Jerdon*); Darjeeling (*Stoliczka*, *Mainwaring*); Khasi, Dafla, and Naga Hills (*Godwin-Austen*); Jaintia Hills (*Beddome*).

Reeve, in accordance with his invariable rule, did not mention any dimensions, but Pfeiffer gave the following measurements (Mon. Helic. Viv. iii, p. 496) from Bensonian specimens:—"Long. 9, diam. 4 mill., ap. 3½ mill. longa, vix 2 lata." The British Museum possesses specimens from the Khasi Hills, one of which is composed of 7½ whorls and measures 15·5 × 7·5 mm., while another, consisting of 8 whorls, only attains a length of 14 mm., with a diameter of 6 mm.

419. **Glessula pulla**, *Blanford.*

Glessula pulla, Blanford, J. A. S. B. xxxix, 1870, p. 21, pl. 3, fig. 20; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 169; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 81, pl. 13, figs. 5, 6.
Achatina (Electra) pulla, Hanley & Theobald, Conch. Ind. 1874, pl. 78, fig. 1.
Achatina pulla, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 287.
Stenogyra (Glessula) pulla, Nevill, Hand List, i, 1878, p. 166.
Stenogyra (Subulina) pulla, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 326.

Original description:—"Testa parva, turrita, tenuis, fusco-cornea, parum nitens, levigata, striatula; spira elongato subconica, lateribus convexiusculis; apice obtuso; sutura impressa. Anfr. 7–8 convexi, breves; ultimus $\frac{2}{7}$ longitudinis sub-æquans, subtus rotundatus. Apert. obliqua, sub-ovata; peristoma tenue; columella arcuata, antice oblique truncata.

"Long. 7, diam. $2\frac{3}{4}$, ap. long. 2, diam. $1\frac{1}{2}$ mm." (*Blanford.*)

Hab. India: Torna, near Poona (*Evezard*, *Blanford*).

"This is allied to *A. Fairbanki*, Bs., but distinguished by its more conical spire, smaller size, and darker colour." (*Blanford.*)

420. **Glessula malabarica**, sp. n.

Shell cylindrico-conoid, rather solid, translucent, pale corneous, slightly shining, with impressed transverse lines, regularly spaced. Spire conoid, slightly convex; suture impressed, subcrenulate;

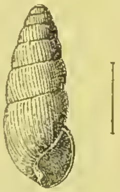

Fig. 135.—*Glessula malabarica.*

apex slightly obtuse. Whorls $7\frac{1}{4}$, very slightly convex, gibbous near the upper suture, the last equalling in width $\frac{1}{3}$ of the entire length of the shell, shortly ascending in front. Aperture vertical, semi-ovate, parietal callus scarcely perceptible; peristome thickened; outer and basal margins regularly curved, columella arcuate, truncate.

Length 7·5, diam. 3 mm.

Hab. India: Malabar (*type*), Travancore (*Beddome*). Type in the British Museum.

The Beddome collection contains five specimens from Malabar, one being whitish corneous, and a dozen from Travancore,

labelled "n. sp. near *pulla.*" *G. malabarica* differs from that species in having a more convex spire and in being of more solid texture, with a thickened peristome, while the last whorl shortly ascends in front. Some of the Travancore specimens are a trifle larger, measuring 8·5 mm. in length, and several are of a darker fuscous colour.

421. **Glessula paupercula**, *Blanford.*

Achatina paupercula, Blanford, J. A. S. B. xxx, 1861, p. 362, pl. 1, fig. 16; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 227; Hanley & Theobald, Conch. Ind. 1875, pl. 102, fig. 1.
Stenogyra (*Glessula*) *paupercula*, Nevill, Hand List, i, 1878, p. 169.
Glessula paupercula, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 170; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 81, pl. 13, fig. 9.
Glessula inconspicua (Nevill), Beddome, l. c. p. 170.

Original description:—"Testa turrito-oblonga, solidula, nitidula, fulvo cornea, impresso-striata; spira turrita, lateribus vix convexis, apice obtusa, sutura sub-marginata. Anfr. 7, parum convexi, ultimus $\frac{1}{3}$ longitudinis subæquans. Columella valde arcuata, basi antice truncata. Apertura ovali-pyriformis; peristoma rectum, intus vix labiatum, marginibus callo junctis.

"Long. 9, diam. 3½ mm., ap. 3 alta, 2 lata." (*Blanford.*)

Hab. India: Kolamullays, Patchamullays, and Shevroy Hills (*King*, *Foote*); Shevroy (*Oldham*); Salem, Anamullays, Tinnevelly, Travancore Hills, and Kurnool Hills (*Beddome*).

"The nearest ally to this small species appears to be the Darjiling *A. crassula*, B. From this it is mainly distinguished by the shape of the spire, which is more convex at the side, by its smaller breadth compared with its length, and by its more marked and slightly marginate sutures. *A. paupercula* is probably common upon the Shevroys. All the specimens, however, found by Mr. King at that locality are bleached, two specimens from the Kolamullies alone retaining their original texture." (*Blanford.*)

Var. **nana**, *Beddome*, l. c. p. 170.

"A shorter more obtuse form, occurring occasionally with the type form, and very like *sattaraensis*, but shorter." (*Beddome.*)

I found some specimens of the form *nana* from Tinnevelly in the Beddome collection, having only six whorls and measuring 5 mm. in length. It approaches *subjerdoni*, especially the var. *minor*, but the latter has a more convex spire. In the same collection I found a large quantity of shells, from the Kurnool Hills, labelled "*G. inconspicua*, Nevill MS.," which I am unable to separate from *paupercula*. I hesitated before recording this fact and thus adding another superfluous MS. name to literature, already encumbered with so many of these, but having found

specimens similarly labelled in Major Peile's possession, it appears probable that shells have been distributed under this name, and therefore may be found in many other collections.

422. **Glessula sattaraensis**, *Hanley & Theobald.*

Achatina fusca, H. Adams, P. Z. S. 1868, p. 15 (not *Achatina fusca*, Pfeiffer, P. Z. S. 1852, p. 67).
Achatina (Electra) sattaraensis (H. Adams), Hanley & Theobald, Conch. Ind. 1874, pl. 78, fig. 4.
Achatina sattaraensis, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 281.
Stenogyra (Glessula) sattaraensis, Nevill, Hand List, i, 1878, p. 167.
Glessula sattaraensis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 293; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 170; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 82, pl. 13, figs. 7, 8.

Original description:—"G. testa oblongo-turrita, solidiuscula, lævigata, obscure striata, nitida, fusco-cornea; spira turrita, apice obtusiusculo, sutura impressa, crenulata; anfr. 7, convexiusculis, ultimus $\frac{3}{8}$ testæ paulo superante; apertura parum obliqua, ovale; columella callosa, valde arcuata, oblique truncata; perist. recto, obtuso, albido marginato, marginibus callo tenui junctis.

"Long. $8\frac{1}{2}$, diam. 4 mill." (*Adams.*)

Hab. India: Sattara, Bombay Pres. (*Layard*). Ceylon: Saharumpore (*Hanley & Theobald*); Rambaddy Ghats (*Beddome*); Nuwara Eliya (*Simon*).

Beddome gives *Glessula fusca*, H. Adams, as a synonym of *G. parabilis*, Bens. (Proc. Malac. Soc. London, vii, p. 204), evidently owing to a *lapsus* for *G. fusca*, Pfeiffer, as on page 170 (*tom. cit.*) he correctly enumerates the former under the synonymy of *G. sattaraensis*. *G. fusca* of Pfeiffer was believed by Hanley and Theobald to be near if not identical with *G. parabilis*.

The only specimen of *G. sattaraensis* I have seen is in the British Museum and is from the collection of H. Adams. It agrees in every respect with the description and with the figure in Conch. Ind.

423. **Glessula capillacea**, *Pfeiffer.*

Achatina capillacea, Pfeiffer, P. Z. S. 1854, p. 294; ibid., Mon. Helic. Viv. iv, 1859, p. 614; Hanley & Theobald, Conch. Ind. 1876, pl. 156, fig. 3.
Achatina (Subulina) capillacea, Pfeiffer, Malak. Blätt. ii, 1856, p. 169.
Glessula capillacea, Nevill, Enum. Helic. Ceylon, 1871, p. 3; Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 292; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 170; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 55, pl. 7, fig. 5.
Stenogyra (Subulina) capillacea, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 326.

Original description:—"T. turrita, tenuis, sub lente capillaceo-striata, nitida, pellucida, virenti-cornea; spira elongata, apice obtusula: anfr. $7\frac{1}{2}$ convexi, ultimus $\frac{1}{3}$ longitudinis vix æquans, peripheria obsolete angulatus; apertura vix obliqua, sinuato-ovalis; columella arcuata, oblique truncata; perist. simplex.

"Long. 9, diam. 4 mill., ap. 3 mill. longa, 2 lata." (*Pfeiffer.*)

Hab. Ceylon (*Thwaites*); Haycock Mountain (*Beddome*).

The type in the Cuming collection only measures 3·5 mm. in diameter, not 4 as stated by Pfeiffer. There are also three specimens, presented by Mr. Preston, one of which is composed of nine whorls and measures 12 mm. in length and 3·5 mm. in diameter.

This species is allied to *G. collettæ*, but has the whorls more closely coiled and a broader base.

424. **Glessula collettæ**, *Sykes.*

> *Glessula collettæ*, Sykes, Proc. Malac. Soc. London, iii, 1898, p. 73, pl. 5, fig. 1; Collett, J. A. S. Ceylon Branch, xvi, 1900, p. 138; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 170; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 60, pl. 7, fig. 13.

Original description:—"Testa elongata, tenuis, lævigata, obscure longitudinaliter striata, nitida, brunnea vel fusco-cornea, apice obtusiusculo; sutura impressa; anfr. 6–$6\frac{1}{2}$, convexiusculi, ultimus $\frac{1}{2}$ altitudinis testæ æquans; apertura fere verticalis, lunato-ovalis, margine columellari calloso, pallidiore oblique truncato.

"Alt. 8, lat. 2·8 mm." (*Sykes.*)

Hab. Ceylon: Ambagamuwa (*Mrs. Collett*).

"Allied to *G. sattaraensis*, H. Ad. (= *G. fusca*, H. Ad., *nom. præocc.*), which is recorded from "Saharumpore, Ceylon," in the Conch. Ind.; but I do not know on whose authority. It was described and figured from "Sattara, Bombay," by Adams, and it may be remarked that the figure in the Conch. Ind. (pl. lxxviii, fig. 4) does not quite resemble that given by Adams (Proc. Zool. Soc. 1868, pl. iv, fig. 10). I expect that the *G. sattaraensis* of Dr. Jousseaume, cited from Nuwara Eliya, is the present species, which is more elongate and slender than the true *G. sattaraensis*." (*Sykes.*)

"Topotyes before me are rather dark yellowish chestnut colored, with sculpture of impressed vertical grooves. These are rather widely separated on the later whorls, but close above. Nearly two whorls at the summit are smooth. Length 8, diam. 2·9, aperture 2·9 mm. long whorls $6\frac{1}{2}$. Compared with *G. p. taprobanica*, this is a more slender shell; hence the whorls appear longer, and they are more evenly convex, the suture being less narrowly impressed." (*Pilsbry.*)

I find *G. collettæ* is allied to *G. gracilis*, Bedd., but it is darker in colour, the spire is a little more slender, and the aperture

narrower. In the British Museum are three unnamed specimens from Ousalava, Ceylon, presented by Mr. Prestou. These undoubtedly pertain to the present species.

425. Glessula subjerdoni, *Beddome.*

Glessula subjerdoni, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 170, pl. 15, fig. 2; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 83, pl. 8, figs. 3, 4.

Original description :—"Testa oblongo-turrita, tenuis, leviter striatula, nitida, subpellucida, fulvo-cornea; spira subturrita, ad apicem obtusiuscula; sutura impressa; anfractus 7–8, subplaniusculi, ultimus $\frac{4}{7}$ longitudinis vix æquans, basi attenuatus; columella leviter arcuata, paulo supra basin aperturæ truncata; apertura verticalis, semi-ovalis; peristoma simplex, obtusiusculum.

"Long. 11, diam. 3·5 mm.; apertura 2·5 mm. longa, 2 lata." (*Beddome.*)

Hab. India: Jeypore and Golcondah Hills, east side of Madras Presidency; Anamullays; Tinnevelly, Sikkim, Darjeeliug (*Beddome*).

"A smaller and more slender shell than *jerdoni*, and much larger than *paupercula*, of which it may be a large form." (*Beddome.*)

"A specimen evidently near *subjerdoni*, but purchased as *G. jerdoni*, and said to be from the Nilgiris, is figured pl. 12, fig. 16. Below the suture there are vertical grooves, strong and regular on the shoulder, but rapidly weakening downwards. The lip is rather thick and whitish-edged. It is a wider shell than *C. p. taprobanensis*, which seems to be closely related. Leugth 9·2, diam. 3·9, aperture 3·25 mm.; whorls 7." (*Pilsbry.*)

Several shells from the Golcondah Hills, in the Beddome collection, do not exceed 10·5 mm. in length, although the diameter measures 4 mm., but some specimens from Darjeeling measure 11·5 × 4 mm. The same collection contains shells from Tinnevelly, having seven whorls and measuring 8·25 mm. in length, and several from Jeypore, labelled var. *minor*, 8·5 mm. in length. Finally I found specimens from the Anamullays, which were labelled *paupercula*, but which certainly must be referred to *G. subjerdoni*.

426. Glessula gracilis, *Beddome.*

Glessula gracilis, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 170, pl. 15, fig. 9; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 83, pl. 8, figs. 17, 18.

Original description:—"Testa parva, cylindrico-turrita, solidula, vix nitens, evidenter striatula; spira elongata, ad apicem obtusa; sutura impressa, crenulata; anfractus 8 planiusculi,

ultimus $\frac{1}{3}$ longitudinis vix æquans, basi parum attenuatus; columella parum obliqua, paulo supra basin aperturæ truncata; apertura verticalis, semi-ovalis; peristoma intus albidum, obtusum.

"Long. 11, diam. 2 mm.; apertura 2·5 mm. longa, 1·5 lata." (*Beddome.*)

Hab. India: Nilgiri Hills, Jeypore, and Shevroy Hills; Travancore (*Beddome*).

"The Jeypore specimens are slightly larger, the whorls rather more convex, and slightly angular close to the sutures." (*Beddome.*)

The type in the British Museum has the upper margin of the peristome slightly damaged and the outer margin descends nearly straight, a fact not mentioned in the diagnosis; and whereas its length is given as 11 mm., it only measures 9·5 mm. A specimen, from the Shevroy Hills, in the Beddome collection possesses nine whorls, which are a trifle less convex than in the type; it measures 11 mm. in length. The same collection also contains specimens from the Shevroy Hills, which were unnamed.

427. **Glessula neglecta**, sp. n.

Shell elongate-conoid, translucent, rather thin, fuscous corneous, glossy, finely and regularly striated. Spire narrow, scarcely convex; suture rather deep, subcrenulate; apex obtuse. Whorls 7, convex, increasing slowly and regularly, the last equalling in width $\frac{2}{7}$ of the entire length of the shell, ascending a little in

Fig. 136.—*Glessula neglecta.*

front. Aperture nearly vertical, broadly obovate, the margins united by a thin callus on the parietal wall. Peristome thickened, outer and basal margins curved; columella slightly arcuate, obliquely truncate.

Length 9, diam. 3·5 mm.

Hab. India: Anamullays (*Beddome*). Type in the British Museum.

Seven specimens of an undetermined species were found in the Beddome collection. Its nearest ally appears to be *G. gracilis*, but that species has a narrower base, is much more strongly striated, the whorls are less convex, the last whorl is narrower,

the spire is more cylindrical, and the aperture smaller, while finally it is of a different hue and its texture is much less glossy.

Some of the specimens are immature, but one possesses $7\frac{3}{4}$ whorls and measures $10 \times 3{\cdot}5$ mm.

428. Glessula pusilla, *Beddome.*

Glessula pusilla, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 171, pl. 15, fig. 5; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 84, pl. 8, figs. 9, 10.

Original description :—" Testa turrito-oblongo, tenuis, nitidula, luteo-cornea, leviter striatula; spira turrita, ad apicem obtusa; sutura crenulata ; anfractus 6–$6\frac{1}{2}$, parum convexi, ultimus $\frac{2}{5}$ longitudinis æquans ; columella valde arcuata, basi antice fere verticaliter truncata ; apertura semi-ovalis ; peristoma rectum, albidum.

" Long. 5–5·5, diam. 1·75–2 mm. ; apertura 1·5 mm. longa, 1 lata." (*Beddome.*)

Hab. India: Anamullay Hills, Shevroys, Nilgiris (*Beddome*). Ceylon: Rambaddy Ghat (*Beddome*).

" Much smaller than *colletta*, its nearest ally, with weaker sculpture and paler colour." (*Beddome.*)

There is something wrong about the measurements given by Beddome, since the type, which was presented by him in 1906 to the British Museum, composed of $6\frac{1}{4}$ whorls, measures $6{\cdot}5 \times 2{\cdot}5$ mm.

429. Glessula courtallica, sp. n.

Shell cylindrico-conoid, thin, polished, translucent and dark fulvous corneous when in fresh condition, very minutely striulate. Spire narrow, with nearly straight sides ; suture impressed ; apex obtuse. Whorls $6\frac{1}{2}$, convex, increasing regularly, the last rather

Fig. 137.—*Glessula courtallica.*

suddenly. Aperture oblique, subovate, peristome with acute margins, no perceptible callus on the parietal wall ; outer margin slightly curved, sinuous in outline ; basal margin regularly curved ; columella deeply arcuate, obliquely truncate.

Length 6·5, diam. 2 mm.

Hab. India: Courtallum, Tinnevelly (*Beddome*). Type in the British Museum.

This new species is nearly allied to *G. pusilla*, Beddome, but is more cylindrical, with more narrowly coiled whorls, a narrower base, and a narrower aperture. Several shells were found in the Beddome collection, labelled *G. courtallica*, a name which has never been published. The type has the periostracum of a milky hue, the result, probably, of exposure, since the other specimens are all of a dark fulvous colour. These, however, only possess from 5 to $5\frac{1}{2}$ whorls. One specimen, with the last whorl broken, is composed of 7 whorls and measures 7 mm. in length.

430. **Glessula mullorum**, *Blanford.*

> *Achatina mullorum*, Blanford, J. A. S. B. xxx, 1861, p. 362, pl. 1, fig. 17; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 228; Hanley & Theobald, Conch. Ind. 1875, pl. 102, fig. 5.
> *Stenogyra* (*Glessula*) *mullorum*, Nevill, Hand List, i, 1878, p. 167.
> *Glessula mullorum*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 171; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 84, pl. 13, fig. 10.

Original description:—"Testa turrito-oblonga, solidiuscula, pallide cornea, diaphana, subremote leviter striata; spira turrita, apice obtusa, sutura impressa. Anfr. 6 convexi; ultimus $\frac{1}{3}$ longitudinis subæquans, basi rotundatus. Columella brevis, arcuata, vix callosa, oblique truncata. Apertura fere semicircularis, verticalis; peristoma rectum, obtusum, marginibus callo tenui junctis.

"Long. $7\frac{1}{2}$, diam. vix 4 mm. Ap. $2\frac{1}{2}$ alta, $1\frac{3}{4}$ lata." (*Blanford.*)

Hab. India: Madras (*Blanford*).

"This is one of the group of small Indian *Achatinas* comprising *A. gemma*, Bens., and *A. scrutillus*, B. From these two shells the present species is distinguished by its conical spire with straight and not convex sides, its paler colour and sculpture. Both varieties were found abundantly crawling on banks, in a garden at Nungumbaukum, a suburb of Madras." (*Blanford.*)

The two varieties to which Blanford refers are the type and a form he records as "var. *α*. anfractus ultimus nitidior, tumidior," but does not name.

431. **Glessula blanfordiana**, *Nevill.*

> *Glessula blanfordiana*, Nevill, J. A. S. B. xlvi, 1877, p. 26; ibid., in Anderson, Zool. Res. Exp. W. Yunnan, i, 1878, Mollusca, p. 886; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 171; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 98, pl. 13, fig. 11.
> *Stenogyra* (*Glessula*) *blanfordiana*, Nevill, J. A. S. B. l, 1881, p. 138, pl. 5, fig. 12.

"Shell ovately turreted, solid, of a dark brown colour, two apical whorls smooth, the others sculptured with raised, coarse, longitudinal, nearly perpendicular striæ, much crowded together

and slightly flexuous on the last whorl; spire turreted, with very obtuse apex and excavated suture; whorls six, scarcely convex, the last one rounded at base; aperture vertical, subquadrilateral, with a much thickened white peristome; columella broadly reflected, thickened, white, curved, forming an acute tooth, with a well developed incised notch at its base.

"Long. 7, diam. 3 mill." (*Nevill*, 1881).

Hab. Burma: Bhamo. China: Ponsee, Yunnan (type) (*Anderson*).

"This species closely resembles *Glessula peguensis*, Blanford, but is less convex, that is, more slender, and of thicker texture; it can also be easily distinguished by the characteristic, crowded, well-developed, nearly perpendicular, longitudinal striation, varying slightly in direction on each whorl, much as in many species of *Pomatias*. The columella also is peculiar." (*Nevill.*)

When first publishing the name *Glessula blanfordiana*, Nevill only added very few words of description and gave no dimensions. This referred to the type from Ponsee, in Yunnan, collected by Anderson. Although he does not expressly state this, it may be presumed that the Bhamo specimens were also collected by Anderson. He subsequently, in 1881, gave a full description which has here been copied. Although the type is stated by Nevill to be in the Indian Museum, the species is not included in his 'Hand List of Mollusca in the Indian Museum.'

432. **Glessula peguensis**, *Blanford*.

Achatina peguensis, Blanford, J. A. S. B. xxxiv, 1865, p. 78; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 228; Hanley & Theobald, Conch. Ind. 1875, pl. 102, fig. 6.
Glessula peguensis, Theobald & Stoliczka, J. A. S. B. xli, 1872, p. 334; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 171; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 99, pl. 13, fig. 12.
Stenogyra (*Glessula*) *peguensis*, Nevill, Hand List, i, 1878. p. 171.

Original description:—"Shell oblong ovate, rather solid, dark reddish brown, horny, marked with distinct and regular impressed lines. Spire convexly conical; apex obtuse; suture impressed, subcrenulate. Whorls $6\frac{1}{2}$, slightly convex; the last ascending a little towards the mouth, and exceeding $\frac{1}{3}$ of the shell in length. Aperture vertical, truncately semicircular; peristome obtuse, slightly thickened; margins joined by a callus; columella very much curved, projecting forwards at the base, subvertically truncated within the peristome.

"Length 7, diam. $2\frac{1}{2}$, length of aperture $2\frac{3}{4}$ millim." (*Blanford.*)

Hab. Burma: Irawadddy Valley, Pegu and Thyet Myo (*Blanford*); Arakan Hills (*Kurz*); Kumah Hill and near Mai-i, Sandoway District, Arakan (*Theobald & Stoliczka*); Chittagong (*Raban*).

"A pretty little species, darker in colour than any of its allies, except perhaps *A. gemma*, Bens., and easily distinguished from all by the columella being more arcuate, also by its more acuminate spire and blunted apex, and its much stronger sculpture." (*Blanford.*)

The species is also allied to *sattaraensis*, but the base is proportionately broader, the shell is more shining, and the striæ are less prominent.

Pilsbry figures a specimen which slightly exceeds Blanford's measurements, being 8·9 mm. in length, diam. 3·9, longest axis of aperture 3 mm.; whorls $6\frac{3}{4}$. The apex is smooth; the rest of the shell is closely and rather deeply but irregularly striate, and very glossy.

Four specimens from Pegu, in the Beddome collection, measure: length 6·5, diam. 7·5 mm.

433. Glessula brevis, *Pfeiffer*.

Achatina brevis, Pfeiffer, P. Z. S. 1861, p. 387; ibid., Mon. Helic. Viv. vi, 1868, p. 227.

Achatina (*Electra*) *brevis*, Hanley & Theobald, Conch. Ind. 1870, pl. 18, fig. 10.

Stenogyra (*Glessula*) *brevis*, as of Blanford, Nevill, Hand List, i, 1878, p. 166.

Glessula brevis, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 171; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 85, pl. 13, fig. 13.

Original description:—"T. conico-ovata, tenuis, pellucida, fulvo-cornea; spira conica, apice obtusulo; anfr. 6, modice convexi, striis a sutura descendentibus deorsum evanescentibus distincte sculpti, ultimus spira paulo brevior, rotundatus; columella antrorsum torta, fere horizontaliter truncata; apertura fere verticalis, sinuato-ovalis; perist. simplex, tenue.

"Long. 8–9, diam. 5–$5\frac{1}{3}$ mill." (*Pfeiffer.*)

Hab. India: Ahmednuggar; Poona (*Blanford*); Jeypore Hills (*Beddome*).

Beddome observes that Hanley's figure is too broad towards the base, and does not show the sculpture, which is peculiar. He also states that his Jeypore specimens were named *microsculpta* MS., by Nevill, but he could not see how they differed from *brevis*. It is unfortunate, I consider, that he burdened literature with another MS. name.

In the Cuming collection I found four specimens accompanied by a label in Pfeiffer's handwriting; they consist of $6\frac{1}{2}$ whorls and measure 11·75 mm. in length and 6 mm. in diameter. The Beddome collection also contains three shells from Poona, which agree fairly well with the type.

434. Glessula filosa, *Blanford.*

Glessula filosa, Blanford, J. A. S. B. xxxix, 1870, p. 19, pl. 3, fig. 16; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 330; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 171; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 85, pl. 13, fig. 14.
Achatina (Electra) filosa, Hanley & Theobald, Conch. Ind. 1870, pl. 36, fig. 10.
Achatina filosa, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 279.
Stenogyra (Glessula) filosa, Nevill, Hand List, i, 1878, p. 168.

Original description:—"Testa sub-rimata, turrita, tenuis, cornea, verticaliter plicato-striata, parum nitida; spira elevata; apice obtuso, brevissime conico, sub-mucronato; sutura impressa. Anfr. 8 convexi, ultimus $\frac{1}{3}$ longitudinis sub-æquans, basi rotundatus.

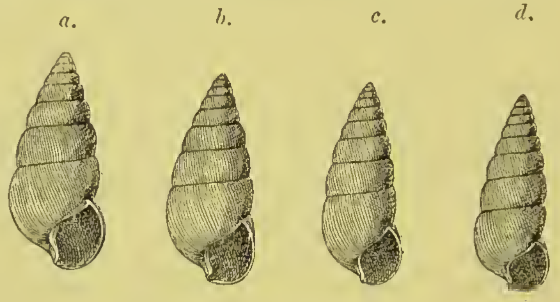

Fig. 138.—*Glessula filosa.*

Apertura verticalis, lunato sub-ovalis; peristoma rectum, tenue; columella arcuata, albida, lamelliformiter extante, tenui, oblique truncata.

"Long. 21, diam. 9 mm. Apert. 7 mill. longa, 5 lata." (*Blanford.*)

Hab. India: Travancore and Tinnevelly (*Beddome*); Shevroy Hills (*Henderson*).

"A peculiar form easily distinguished by its strong sculpture, abrupt subconical apex, and by the columella standing out from the last whorl, so as to have a groove ruuning along its side." (*Blanford.*)

Fig. 139.—*Glessula filosa*, var. *exigua.*

This species varies considerably in contour and size, but the groove by the side of the columella, referred to by Blanford, is not always perceptible. The four shells from Travancore here figured, which are in the Beddome collection, give some idea of the range

in size and shape; their dimensions are as follows:—fig. 138 *a*, 26 × 12 mm.; fig. 138 *b*, 25 × 11·25 mm.; fig. 138 *c*, 24 × 9·75 mm.; fig. 138 *d*, 23·75 × 9 mm. In the British Museum are four shells from Tinnevelly, composed of $8\frac{1}{2}$ whorls and measuring 19 × 7·75 mm.

Var. **exigua**, n.

Differs from typical *filosa*, besides being smaller, in having the whorls more tumid and the suture deeper; the last whorl also contracts somewhat towards the aperture.

Length 12·5 mm., diam. 6 mm. (8 whorls).

Hab. India: Sirumullay Hills, Dindigul.

This form I found in the Beddome collection intermixed with *G. subfilosa*.

435. Glessula subfilosa, *Beddome*.

Glessula subfilosa, Beddome, Proc. Malac. Soc. London, vii, 1906, p. 171, pl. 15, fig. 8; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 86, pl. 8, figs. 15, 16.

Original description:—"Testa elongato-turrita, tenuis, fulvo-cornea, distincte plicato-striata; spira elongata, ad apicem subobtusa, elongato-conica; sutura impressa; anfractus 10 planiusculi, ultimus subcarinatus $\frac{1}{3}$ longitudinis tortins vix æquans; apertura lunato-subovalis; peristoma tenue; columella valde arcuata, oblique abrupte truncata.

"Long. 16, diam. 5 mm.; apertura 5 mm. longa, 3 lata." (*Beddome.*)

Hab. India: Sirumullay Hills, Dindigul; Kurnool (*Beddome*).

"The prominent sculpture is like that of *filosa*, but it is a very much smaller shell, with a much more elongated apex." (*Beddome.*)

The type, which is in the British Museum, appears not quite full grown; it possesses $9\frac{3}{4}$ whorls, and measures: length 17·5 mm., diameter 6·5 mm. It will be seen that these details do not agree with those given by Beddome when describing the species.

The principal character separating this species from *G. filosa* is the attenuated spire, concave near the apex, which is obtuse, not acute as in the latter. The aperture is also less high in proportion to its width.

436. Glessula lyrata, *Blanford*.

Glessula lyrata, Blanford, J. A. S. B. xxxix, 1870, p. 20; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 331; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 172; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 86, pl. 13, fig. 15.

Achatina (Electra) rugata, Hanley & Theobald, Conch. Ind. 1870, pl. 18, fig. 9.

Achatina rugata, Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 281.

Stenogyra (Glessula) lyrata, Nevill, Hand List, i, 1878, p. 167.

Original description :—"Testa ovato-turrita, solidula, cornea, parum nitida, verticaliter costulato-plicata, sub-lente lineis minutissimis confertis spiralibus, sæpe obsoletis, decussata; spira pyramidalis, lateribus vix convexis; apice obtusulo; sutura profunda. Anfr. 7½ convexi, infra suturam obsolete sub-angulati, ultimus antice paulo ascendens. Apertura verticalis, truncata, semiovalis; peristoma obtusum; columella mediocriter arcuata, antice oblique truncata.

"Long. 12, diam. 5½, ap. long. 4, lat. 2⅓ mm." (*Blanford.*)

Hab. India: Mahableshwar, and Khandala, W. Ghats (*Blanford*).

"This shell resembles in form *A. oreas*, Bens., but it is distinguished from that and all other allied species by its stronger sculpture. Possibly the two varieties should be ranked apart, as there is considerable difference between them. A third form, shorter and more tumid, occurs near Poona. As other intermediate varieties probably exist, I prefer for the present classing all in one species, but it may hereafter be desirable to distinguish them.

Var. **matheranica**, *Blanford*, l. c. p. 21, pl. 3, fig. 19; Pilsbry, tom. cit. p. 87, pl. 13, fig. 16.

Stenogyra (*Glessula*) *matheranica*, Nevill, Hand List, i, 1878, p. 167.

"Minor, magis polita, lineis spiralibus carentibus, sculptura in anfractu ultimo obsolescenti.

"Long. 10, lat. 4½ mill." (*Blanford.*)

Hab. India: Matheran, near Bombay.

It is rather surprising that Blanford should have compared this species with *oreas*, while overlooking its much closer affinity with *filosa* described in the same paper, the sculpture being very similar. The latter is, however, a larger shell with broader base and acute apex.

In typical specimens of *G. lyrata* the last whorl is not wider than the penultimate and ascends a little in front, while the spire is concave. The variety *matheranica*, on the other hand, has a convex spire; it is, moreover, considerably smaller, and the sculpture is much less apparent on the base. The two forms are, perhaps, as suggested by Blanford, entitled to rank as distinct species, but I have not seen sufficient material to form a definite opinion. Major Peile has sent me for inspection some shells from Mahableshwar, one of which possesses 8 whorls and measures 13×6 mm.; another, of 7½ whorls, measures 11·5 × 5·25.

437. **Glessula rugata**, *Blanford.*

Glessula rugata, Blanford, J. A. S. B. xxxix, 1870, p. 20, pl. 3, fig. 18; Beddome, Proc. Malak. Soc. London, vii, 1906,

p. 172; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 87, pl. 7, figs. 11, 12.
Achatina rugata, Hanley & Theobald, Conch. Ind. 1875, pl. 102, fig. 7; Pfeiffer, Mon. Helic. Viv. viii, 1877, p. 293.
Stenogyra (Glessula,) rugata, Nevill, Hand List, i, 1878, p. 166.
Stenogyra (Subulina) rugata, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 328.

Original description:—"Testa turrita, cornea, tenuis, parum nitida, verticaliter coufertim plicato striata: striis sub-lente minute et regulariter granulatis, interstitiis lineis minutis confertis transversis (spiralibus) in anfractibus superis validioribus, decussatis; spira elongato conica; apice obtuso; sutura profunda. Anfr. 7½ convexi, ultimus ¼ longitudinis sub-æquans. Apertura obliqua fere ovata; peristoma tenue, rectum; columella valde arcuata, antice oblique truncata.

"Long. 6, diam. 2 mm., ap. 1½ mill. longa, 1 lata." (*Blanford.*)

Hab. India: Singhur near Poona (*Blanford*); Poorundhur (*Evezard*).

"No described Indian species of *Glessula* possesses sculpture at all resembling that of the present small form. Under an ordinary lens the shell appears to have a plicate striation, but beneath a stronger power the striæ are seen to be regularly nodose, and the decussating lines become distinctly visible. The markings are very elegant and regular, almost resembling those on some West Indian forms of *Cyclostomidæ*, as *Choanopoma*." (*Blanford.*)

The form taken by Evezard at Poorundhur, in the Bombay Presidency, is separated by Blanford as "*var. major*, long. 7 mill."

The Beddome collection contains several specimens from Singhur Hill. These are rufous corneous and exhibit the decussating spirals referred to by Blanford, which are excessively fine and close, being especially noticeable in fresh shells. The Cuming collection also contains four specimens.

438. **Glessula latestriata**, *Möllendorff*.

Glessula latestriata, Möllendorff, Nachr. Deuts. Malak. Ges. 1899, p. 166; Beddome, Proc. Malac. Soc. London, vii, 1909, p. 172; Pilsbry, Man. Conch. ser. 2, xx, 1909, p. 100.

Original description:—"T. ventricosulo-oblonga, tenuiuscula, subpellucida, striis impressis sat distantibus peculiariter sculpta, corneo-flavescens. Spira modice elongata lateribus convexiusculis, apice acutulo. Anfr. 7 modice convexi, sutura bene impressa, subcrenulata disjuncti. Apert. fere verticalis, rotundato-rhomboidalis, peristoma rectum, obtusum, columella sat torta, abrupte truncata.

"Diam. 4·5, alt. 10, apert. long. 3·5, lat. 2·25 mm." (*Möllendorff.*)

Hab. Burma: Southern Shan States (*Strubell*).

A small form not seen by me.

439. **Glessula simoni**, *Jousseaume.*

Glessula simoni, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 293, pl. 4, fig. 10; Beddome, Proc. Malac. Soc. London, vii, 1906, p. 172; Pilsbry, Man. Conch. ser. 2, xx, 1908, p. 61, pl. 7, fig. 8.

Original description:—"Testa parva ovata, tenuis, costulata, nitida, pellucida, fulvo-cornea, spira conoidea apice obtusiuscula, sutura impressa; anfr. 5–6 convexi, ultimus demidium longitudinis æquans, basi vix attenuatus, rotundatis; apertura verticalis, semiovalis; perist. rectum, tenue, acutum, margine dextra minus arcuato; columella callosa, subrecta, valde arcuata, oblique truncata ad umbilicum appressa et depressa.

"Alt. 3 mill.; diam. 1·5 mill." (*Jousseaume.*)

Hab. Ceylon: Slopes of Pedro, Nuwara Eliya (*Simon*).

Four live specimens were taken by Simon, but two of them were younger than the one made the type by Jousseaume, which he considered immature.

"This minute form has about the size of a *Tornatellina*, but seems to be more strongly sculptured than is usual in that genus. The embryonic whorls are smooth, a litttle darker than the rest of the shell." (*Pilsbry.*) The latter statement is evidently a *lapsus*, for Jousseaume distinctly states that they are *less* dark than the remainder of the shell.

Genus **DIGONIAXIS**, *Jousseaume.*

Digoniaxis, Jousseaume, Bull. Soc. Malac. France, vi, 1889, p. 349; Pilsbry, Man. Conch. ser. 2, xix, 1908, p. 288.

"Ce genre est remarquable par son axe columellaire autour duquel se déroulent deux lamelles très saillantes, dont la plus forte s'aperçoit sur tout le prolongement de l'axe, grace à l'extrême ténuité du test; par son dernier tour méplan à la partie médiane et sur une étroite zone circumsuturale, et caractérisé par deux angulosités, dont l'une supérieure sépare la zone méplane-tectiforme du pourtour de la suture de la surface plane médiane, et dont l'autre limite cette surface à la partie inférieure." (*Jousseaume.*)

"A genus of uncertain position, possibly near *Calaxis*, as M. Jousseaume believes, but differing in the longer spire and the strong development of a spiral lamella superposed upon the upper part of the columella. There are no parietal or palatal lamellæ. The internal axis, as seen through the shell, is strongly spiral, the upper lamella penetrating deeply, according to Jousseaume. It is possible, however, that the spiral condition is due to the basal lamella." (*Pilsbry.*)

440. **Digoniaxis cingalensis**, *Benson.*

Spiraxis cingalensis, Benson, A. M. N. H. ser. 3, xi, 1863, p. 91; Pfeiffer, Mon. Helic. Viv. vi, 1868, p. 191: Hanley & Theobald, Conch. Ind. 1874, pl. 79, fig. 1.

Stenogyra (*Spiraxis* (*Euspiraxis*)) *cingalensis*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 323.
Digoniaxis cingalensis, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 291; Pilsbry, Man. Conch. ser. 2, xviii, 1906, pl. 4, fig. 18; xix, 1908, p. 289.

Original description:—" S. testa subrimata, subulato-turrita, gracili, solida, polita, striatula striis minutis confertissimis undulatis spiralibus decussata; spira elongata, superne sensim attenuata, apice ——?; sutura vix impressa, irregulari; anfractibus superstitibus 11 (apicalibus deficientibus), planulatis, ultimo ad basin rotundato; apertura subobliqua, emarginato-elliptica; peristomate recto, intus ad angulum superiorem calloso; margine dextro superne arcuato, basali incrassato, columellari calloso, expansiusculo, subreflexo, superne plica obliqua spirali solida munito.

"Long. 14, diam. 3 mill., ap. long. 3, diam. 1½ mill." (*Benson.*)

Hab. Ceylon: Weelgamoowe, Matelle (*Layard*).

" A *Syrnola*-like shell, differing from *Tortaxis* by the spiral plait on the upper part of the columella. Its solidity causes me to place it in *Digoniaxis* with some doubt, especially since it belongs to a different fauna." (*Pilsbry.*)

Family SUCCINEIDÆ.

Genus **SUCCINEA**, *Draparnaud.*

Succinea, Draparnaud, Tabl. Moll. Terr. fluv. France, 1801, p. 55; C. Pfeiffer, Syst. Anordn. Beschr. Land- und Wasserschn. 1821, p. 66; Gray in Turton, Manual, 1840, p. 177; Pfeiffer, Mon. Helic. Viv. i, 1848, p. xiv; Adams, Gen. Rec. Moll. ii, 1855, p. 128; Lehmann, Leb. Schn. Musch. Umg. Stettins, 1873, p. 49 (anatomy); Ihering, Jahrb. Deuts. Malak. Ges. iv, 1877, p. 138 (anatomy); Fischer, Man. Conchyl. 1883, p. 490, fig. 261 (radula).

Type: (first species) *Helix putris*, Linné (=*Succinea oblonga*, Draparnaud).

Range. All parts of the globe.

Shell imperforate, oval, thin, horny, more or less translucent; spire conical, short, whorls rapidly enlarging, the aperture large, oblong, columella simple, peristome simple, acute.

Animal with a large foot; tentacles short, the upper pair conoid, swollen at the base, the lower pair scarcely visible, sometimes absent.

"The hermaphrodite gland, both as regards structure and position, does not exhibit any special features; the same applies to the thick, sausage-shaped hermaphrodite duct which is very prominent on account of its dark coloration, derived from the superimposed pigmented cells of the connective tissue. Both before and after pairing time I found it crowded with spermatozoa. The epithelium is not vibratory. Where it approaches

the albumen gland it contracts considerably, enlarging inside the latter to a pouch of about 2 mm. in size. This inflation, which I propose to designate as a fecundation pouch, has not been described either in *Succinea* or other Pulmonates. The same applies to the two seminal vesicles opening out into it. The latter are two club-shaped vesicles, whose solid walls consist of an integument of connective tissue and a non-vibratory epithelium. These large seminal vesicles at once arrest the attention during preparation, without the aid of a lens. Close to this occurs the opening of the hermaphrodite duct. The efferent ducts of the albumen gland open out on the opposite side. Downwards the fecundation pouch is continued in the uterus on the one hand, and on the other in the male duct, which does not, as in *Helix*, run for some distance as a groove in the wall of the uterus, but separates above from the uterus at the albumen gland. The fecundation pouch is invested with a cylinder epithelium, which is raised into numerous broad folds, of which sometimes one, at other times several, are covered with epithelium. Immediately below the fecundation pouch the uterus is provided with a short cæcum-like appendage, invested by a cylinder epithelium, the walls of which are repeatedly thrown into folds and, on account of their white colour, very prominent. Thence the uterus descends in numerous spiral twists around a vessel-trunk, serving as axis. The walls assume a transparent gelatinous aspect. Upon microscopic examination, the outer layer is found to consist of a homogeneous tender membrane with embedded granules, and invested anteriorly with a large-meshed network of fine vessels, the interstices being occupied by large globular pale cells. It might easily be imagined these were unicellular glands, but no efferent openings could be observed in any of them.

"If therefore these cells are concerned in the secretion of mucus, in which the perfect ova are embedded, their contents must penetrate into the cavity of the uterus through the delicate membrane of these cells. The lower part of the uterus is somewhat more dilated and not coiled. It is very prominent owing to its reddish colour. The narrow and rather short duct of the receptaculum seminis joins the uterus not far from the external genital orifice.

"The lower portion of the uterus, from this point to the external orifice, may be fitly designated as the vagina. The female genital orifice occurs on the right side, somewhat below and behind the upper tentacle, close to the male orifice. In *Succinea*, therefore, we do not find a common genital cloaca or vestibule, as in *Helix*, but, as in *Limnæa*, the male and female genitalia have distinct external apertures.

"The vas deferens descends along the coiled portion of the uterus and bears where the latter passes into the straightened portion, a rather large, laterally appressed gland—the prostate. The penis, which is provided with a single retractor muscle, is a thick-walled muscular simple tube. It is situate in front of the

vagina, and between them lies the right upper tentacle, which winds around the penis and next proceeds backwards between the latter and the vagina. The outlet of the penis is at the side but in front of that of the vagina.

"In the distinct outlet of the excretory ducts the generative organs in *Succinea* present a condition resembling *Limnæa*. The resemblance is nevertheless slight, to which no weight is to be attached in view of the undoubted close relationship between *Succinea* and the HELICIDÆ. In this respect I feel bound to follow Semper, but I am unable to agree with his opinion that the quadrate plate of the jaw found in Elasmognatha also occurs, only less strongly chitinized, in the HELICIDÆ." (*Ihering.*)

441. **Succinea indica**, *Pfeiffer.*

Succinea indica, Pfeiffer, P. Z. S. 1849, p. 133; ibid., Mon. Helic. Viv. iii, 1853, p. 8; ibid., Conch.-Cab., *Succinea,* 1855, p. 45, pl. 4, figs. 39, 40; Reeve, Conch. Icon. xviii, 1872, *Succinea,* pl. 1, fig. 2; Hanley & Theobald, Conch. Ind. 1874, pl. 67, figs. 1, 4; Nevill, Hand List, i, 1878, p. 212.

Succinea (*Tapada*) *indica,* Pfeiffer, & Clessin, Nomencl. Helic. Viv. 1881, p. 412.

Original description:—"S. testa depresse oblonga, tenuissima, longitudinaliter plicatula, pellucida, pallide cornea; spira brevi, obtusiuscula; anfractibus vix 3, penultimo convexiusculo, ultimo $\frac{2}{3}$ longitudinis æquante; columella substricte fere ad basin recedente, superne calloso-marginata; apertura axi fere parallela, basi recedente, ovali-oblonga, angulata, intus nitidissima; peristomate acuto, margine dextro leviter arcuato.

"Long. 17, diam. $7\frac{1}{2}$, alt. 6 mill.; ap. 12 mill. longa, infra medium 7 lata." (*Pfeiffer.*)

Hab. India: Bheemtal (*Pfeiffer*); Srinuggar (*Stoliczka*); Himalayas (*Mus. Cum.*); Kashmir (*Thomson*).

A thin and transparent species with a slender spire. Some shells in the British Museum from the type locality are rather small and whitish corneous, while four, labelled Himalayas in the Cuming collection, are amber coloured. Four unnamed specimens from Kashmir, in the British Museum, presented by Dr. J. Thomson, I also refer to *S. indica*, but they only possess $2\frac{1}{2}$ whorls and measure 11 mm. in diameter, while several shells collected by Stoliczka in the same country form part of the Beddome collection in the British Museum; one of these, possessing $2\frac{3}{4}$ whorls, measures: length 20, diam. 9 mm.

Jickeli records the species from the neighbourhood of the Mahmudi Canal, near Alexandria*, stating that his specimens differ from the Indian shell by their firmer texture, darker colour, and more slender form. I have not seen the Egyptian shells, but to judge from the figures they appear quite distinct, not only

* Nova Acta K. Leop.-Carol. Akad. xxxvii, no. 1, 1874, p. 167, pl. 6, fig. 11.

being of more slender form but the spire is considerably shorter in proportion to the last whorl, which is also much more tumid at the base and has the basal margin more truncate.

442. Succinea plicata, *Blanford.*

Succinea plicata, Blanford, J. A. S. B. xxxiv, 1865, p. 80; Pfeiffer, Mon. Helic. Viv. v, 1868, p. 29; Reeve, Conch. Icon. xviii, 1872, *Succinea*, pl. 2, fig. 11; Hanley & Theobald, Conch. Ind. 1874, pl. 67, fig. 8; Nevill, Hand List, i, 1878, p. 212.
Succinea (Tapada) plicata, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 412.

Original description:—"Shell depressly subovate, very thin, irregularly, obliquely and more or less coarsely plaited, pale amber in colour, horny. Spire short; apex minutely papillar. Whorls 2½; the last about $\frac{4}{5}$ of the entire length. Aperture oblique, curved backwards at the base, nearly oval, openly angulate above; peristome simple; columellar margin regularly bow-shaped; right margin rather straighter.

"Length 17, diam. 9½ millim., height 6 millim. Aperture 14 millim. long, 8 broad." (*Blanford.*)

Hab. Burma: Tongoop, Arakan, and south of Bassein, Pegu (*Blanford*).

"This species approaches *S. semiserica*, Gould, but is distinguished from that and from all other Indian species by its coarse sculpture. It has also a larger spire than *S. semiserica*. It is not common: indeed species of the genus *Succinea* are generally but very locally distributed in India and Burma." (*Blanford.*)

Apparently a rare species not seen by me.

443. Succinea rutilans, *Blanford.*

Succinea rutilans, Blanford, J. A. S. B. xxxix, 1870, p. 23, pl. 3, fig. 23; Reeve, Conch. Icon. xviii, 1872, *Succinea*, pl. 2, fig. 14; Hanley & Theobald, Conch. Ind. 1874, pl. 67, fig. 10; Pfeiffer, Mon. Helic. Viv. vii. 1876, p. 37; Nevill, Hand List, i, 1878, p. 211.
Succinea (Tapada) rutilans, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 412.

Original description:—"Testa sub-ovata, tenuis, aurantiaca, striatula, nitidula; spira conoidea; apice sub-papillato; sutura impressa. Anfr. 2½, penultimus convexus, ultimus tumidus ¾ longitudinis formans, basi rotundatus. Apertura obliqua, ovata; peristoma rectum; columella regulariter arcuata, subsimplex. Long. 10½, diam. 6½, alt. 4¼, ap. long. 8, lat. infra medium 5 mm." (*Blanford.*)

Hab. India: Cherra Poonjee, Assam (*Godwin-Austen*).

"A more regular ovate shell than *S. daucina*, Pfr., which it otherwise resembles." (*Blanford.*)

Reeve indicates Calcutta as the habitat, but, as his localities are notoriously unreliable, this must be accepted under reservation.

I have only seen three specimens from the Khasi Hills, which are in the Beddome collection.

444. **Succinea godivariana**, sp. n.

Shell minutely rimate, depressedly subovate, finely obliquely striated, pale greenish corneous. Spire very short, apex minutely papillate, suture deep. Whorls $2\frac{1}{4}$, tumid, the last equalling about $\frac{5}{7}$ of the total length of the shell. Aperture oblique, obovate; peristome simple; columella slightly thickened and reflexed, covering the exceedingly minute umbilical slit; outer and basal margins regularly curved.

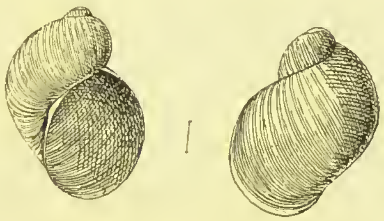

Fig. 140.—*Succinea godivariana.*

Long. 3·5, diam. 2·5, alt. 1·5 mm. Apert. 2·5 mm. long, 1·75 mm. broad.

Type in Mr. G. C. Leman's collection.

Hab. India: Gorge Hill, Godivari (*Beddome*).

Seven unnamed specimens in the Beddome collection—now in Mr. Leman's possession—proved on examination to pertain to an undescribed form.

The new apecies is the smallest *Succinea* known, and somewhat resembles a miniature *S. rutilans*, but that species is twice as large and differs besides in colour.

445. **Succinea collina**, *Hanley & Theobald.*

Succinea collina (Blanford MS.), Hanley & Theobald, Conch. Ind. 1870, p. 30, pl. 68, figs. 8, 9, var. fig. 10; Reeve, Conch. Icon. xviii, 1872, *Succinea*, pl. 1, fig. 1; Nevill, Hand List, i, 1878, p. 212; Blanford, J. A. S. B. xlix, 1880, p. 200.

"Testa conico-ovata, tenuiuscula, parum nitida, distincte atque flexuose striata, viridiscente-cornea. Spira scalaris, apice acutiuscula, sutura valde impressa. Anfr. vix 3, perconvexi, ultimus longitudinis subæquans. Apertura ovata, obliqua; peristoma tenue, margine dextro mediocriter arcuato; columella arcuata, recedens, callosa.

"Long. 17, diam. 10, alt. (v. diam. min.) 6 mm., apertura 13 mm. longa, vix 9 lata." (*Blanford.*)

Var. **aurantiaca** v. **rufo-cornea.**

Hab. India: Western Ghats, Mahableshwar (*Blanford*); var. Torna Hills (*Blanford*); Pondicherri (*Mus. Cuming*); Poona (*Beddome Coll.*).

"Shell conically ovate, rather thin, but little polished, distinctly and flexuously striated, greenish horny in colour. Spire step-like, apex rather pointed, suture much impressed. Whorls scarcely 3, very convex, the last about $\frac{3}{4}$ of the length. Aperture oval, oblique; peristome thin, the right margin moderately curved forwards; the columella arcuate, receding, and covered with a thin callus. The largest shell I possess measures 20 mm. in length. A rufous variety occurs at Torna Hill, near Sinhgarh, west of Poona.

"This is a rock-inhabiting species, found on cliffs and large blocks of basalt at Mahableshwar and Torna, and is allied to *S. girnarica*, a larger and thicker form, rather differently shaped, found by Mr. Theobald on the basaltic rocks of Girnar Hill, in Kattywar. The animal of *S. collina* bears a considerable external resemblance to that of the subgenus *Lithotis*, which has a similar habit. The figures in the 'Conchologia Indica' give a fair idea of the species, but the spire in fig. 8 is rather too large." (*Blanford.*)

Both *S. collina* and *S. girnarica* are somewhat variable, and differ practically only by the former having a more slender spire, more distant and coarser striæ—being almost ribbed in fact—and in being usually greenish corneous; but some shells in the Beddome collection, from the Bombay Ghats, are amber coloured; they range from 13 to 16 mm. in the greater diameter.

The type, illustrated in Conch. Ind. pl. 68, figs. 8 and 9, has been presented to the National Collection by Mr. Harvey, as well as the shell shown in fig. 10 on the same plate, from the type locality. This latter form is very distinct, with very tumid whorls, and although it has a mature appearance it is composed of only $2\frac{1}{4}$ whorls and has a diameter of 7·5 mm. On the other hand, three shells in the Theobald collection, also from Mahableshwar, measure 15 mm. in diameter. The Cuming collection contains three specimens from Pondicherri, labelled *S. rugosa*, but they are not that species and, although a pale form, I refer them without hesitation to *S. collina*; they measure :—16 × 10 × 6 mm. The variety *aurantiaca* is also very distinct from the type in appearance, being of a dark amber colour; three specimens from the Bombay Ghats, in the Beddome collection, possessing three whorls, measure: length 19, diam. 11 mm. The same collection comprises some shells from Mahableshwar which are rather paler than the typical form and are in beautiful fresh condition, exhibiting some distant irregular spirals; they are also composed of three whorls, but measure: length 24, diam. 15 mm., and are therefore considerably larger than the type.

446. **Succinea girnarica**, *Theobald.*

Succinea girnarica, Theobald, J. A. S. B. xxviii, 1859, p. 309; Pfeiffer, Mon. Helic. Viv. v, 1868, p. 29; Reeve, Conch. Icon. xviii, 1872, *Succinea*, pl. 1, fig. 5; Hanley & Theobald, Conch. Ind. 1874, pl. 67, figs. 5, 6; Nevill, Hand List, i, 1878, p. 212.
Succinea (*Tapada*) *girnarica*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 412.

Original description :—"Testa oblongo-ovata, solida, non polita, tumida, fortiter striata, rubro flavescente magis minusve rutilo, aliquando pallescenti; anfract. $2\frac{1}{2}$ rapidissime crescentibus, ultimo capacissimo. Apertura rotundata. Perist. tenui.

"Diam. 1·07 [=27 mm.], 0·61 [=15·25 mm.]; alt. 0·42 poll. [=0·5 mm.]." (*Theobald.*)

Hab. India: Girnar Hills, Kattywar (*Theobald, Foote*).

"Few specimens attain the dimensions here given. The largest shells are found on the peaks of the eastern portion of the Girnar Hills, and at a lower elevation of about 2000 feet the shells are much smaller and paler coloured." (*Theobald.*)

Generally speaking, *S. girnarica* may be readily distinguished from *S. collina* by its larger size, its bright amber colour, sometimes shading to pink, by the more rapidly increasing whorls and the consequently more dilated aperture.

Three shells in the Theobald collection range in size between 27 and 18 mm., although they all possess $2\frac{1}{2}$ whorls, while three in the Cuming collection measure 19 mm. and have the last whorl tinted with a pink hue outside. All these are from Girnar Hill. The specimen figured in Conch. Ind. has been presented to the British Museum by Mr. Harvey; it measures 23·5 mm., although the line, indicating its size, on the plate is only 21 mm. The Blanford collection contains specimens collected in the type locality by Foote; they measure 15 × 11 × 6·5 mm.

Var. **viridescens**, nov.

Two shells of unknown origin in the British Museum, labelled "highest pinnacle of Mt. Girnar" are sufficiently distinct from the type to rank as a variety. They are of a very pale greenish corneous colour, and measure: major diam. 16, minor 10, alt. 6 mm. The Blanford collection also comprises two specimens from Kattywar.

447. **Succinea rugosa**, *Pfeiffer.*

Succinea rugosa, Pfeiffer, Symb. Hist. Helic. ii, 1842, p. 56; ibid., Mon. Helic. Viv. ii, 1848, p. 517; ibid. Conch.-Cab., *Succinea*, 1855, p. 53, pl. 5, figs. 36, 37.
Succinea (*Brachyspira*) *rugosa*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 410.

Original description.—"T. ovato-ventricosa, tenui, oblique

rugosa, nitide fulvescente; spira brevissima; anfr. 2½, ultimo inflato; apertura ovali, margine sinistro valde arcuato; perist. simplice, membranaceo.

"Long. 14, diam. 10 mill." (*Pfeiffer.*)

Hab. India: Pondicherri (*Guérin*).

Only known from the description and figure. I have not seen any shells which can be referred to this species.

448. **Succinea semiserica**, *Gould.*

Succinea semiserica, Gould, Proc. Boston Soc. Nat. Hist. ii, 1846, p. 100; Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 10; iv, 1859, p. 805; Gould, Otia Conch. 1862, p. 199; Hanley & Theobald, Conch. Ind. 1874, pl. 67, figs. 2, 3: Nevill, Hand List, i, 1878, p. 212.

Succinea semisericea, Reeve, Conch. Icon. xviii, 1872, *Succinea*, pl. 2, fig. 9.

Succinea (*Brachyspira*) *semiserica*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 410.

Original description:—"Testa fragilis, ovalis, a tergo depressa, postice straminea, antice albido-sericea, longitudinaliter plicoso-striata; anfr. 2½, ultimo maximo; apertura ovata, patula, faciem inferiorum fere adequante.

"Long. ½ [=12·75 mm.]; lat. $\frac{3}{10}$ [=7·6 mm.]; alt. $\frac{3}{20}$ poll. [=3·8 mm.]." (*Gould.*)

Hab. Burma: Tavoy (*Gould*); Rangoon, Moulmain (*Stoliczka*); Chittagong (*Raban*); Pegu (*Theobald*); Mergui (*Mus. Brit.*).

"Its shape is like *S. tigrina*, Fér., and it is well characterized by the peculiar silky-white or pearly surface of the anterior half of the shell." (*Gould.*)

Nevill considered *S. plicata*, Blanford, and perhaps *S. baconi*, Pfeiffer, cospecific with *semiserica*. The three forms are, however, quite distinct. The present species has an extremely short spire and is finely, distantly ribbed. Owing to a deficiency of calcareous matter the shell is very brittle. This applies especially to some shells from Rangoon, in the Theobald collection, which are labelled *S. rangoonensis*—a name never published—but which pertain to the present species; they are extremely thin, almost transparent, and of a fuscous corneous colour. Their dimensions exceed those given by Gould, *i.e.* 15×9×3. Three specimens from Pegu, in the Theobald collection, are pale greenish corneous. The Cuming collection comprises shells from Tavoy measuring 14×8×3·5 mm., which therefore also exceed Gould's type in size; on the other hand, there are specimens from Mergui in the general collection of the British Museum which attain a size only of 8×4·5×2 mm.

449. **Succinea baconi**, *Pfeiffer.*

Succinea baconi, Pfeiffer, P. Z. S. 1854, p. 298; ibid., Mon. Helic. Viv. iv, 1859, p. 804; Reeve, Conch. Icon. xviii, 1872, *Succinea*,

pl. 1, fig. 6; Hanley & Theobald, Conch. Ind. 1874, pl. 68, figs. 1, 4; Nevill, Hand List, i, 1878, p. 214.
Succinea (Brachyspira) baconi, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 410.

Original description:—"S. testa semiovato-acuminata, tenuissima, longitudinaliter subundulato-plicata, pellucida, nitida, pallide cornea; spira parvula, submucronata; anfract. 2 cum apiculo punctiformi, penultimo convexo, ultimo $\frac{5}{6}$ longitudinis formante, basi subattenuato; columella filosa, superne subplicata; apertura obliqua, subregulariter acuminato-ovali, non incumbente; perist. simplice, margine dextro antrorsum arcuato.

"Long. 15, lat. 10, alt. 6 mill." (*Benson.*)

Hab. India: Calcutta (*Bacon*); South Canara (*Beddome*).

Of this species I have seen two specimens in the Cuming collection, bearing Pfeiffer's own label. *S. baconi* is very fragile and thin, whitish corneous, and may be regarded as intermediate in character between *S. semiserica* and *S. daucina*, but some specimens in the Blanford collection are somewhat amber coloured and, although possessing $2\frac{1}{2}$ whorls, only measure: length 14, diam. 9 mm. In the Beddome collection are some shells from South Canara.

450. **Succinea daucina**, *Pfeiffer.*

Succinea daucina, Pfeiffer, P. Z. S. 1854, p. 298; ibid., Mon. Helic. Viv. iv, 1859, p. 810; Reeve, Conch. Icon. xviii, 1872, *Succinea*, pl. 3, fig. 19; Hanley & Theobald, Conch. Ind. 1874, pl. 67, fig. 7; Nevill, Hand List, i, 1878, p. 212.
Succinea (Tapada) daucina, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 412.

Original description:—"S. testa ovato-conica, solidula, leviter striatula, oleoso-micante, lutescenti-rubella; spira conica, apice subpapillata; anfract. 3, penultimo convexo, ultimo $\frac{4}{5}$ longitudinis formante, basi parum attenuato; columella filari, leviter arcuata; apertura obliqua, incumbente. acuminato-ovali, basi lata; perist. simplice, marginibus subsymmetricis.

"Long. $9\frac{2}{3}$, lat. 6, alt. $4\frac{1}{2}$ mill." (*Pfeiffer.*)

Hab. India: Calcutta (*Bacon*); Port Canning (*Nevill*).

The present species is readily distinguished from its nearest allies by the slightly inflexed outer margin of the peristome. In the Cuming collection are four shells, labelled by Pfeiffer himself, none of which, however, exceeds 9 mm. in diameter. The specimen figured by Hanley and Theobald has been presented to the National Collection by Mr. Harvey.

451. **Succinea crassinuclea**, *Pfeiffer.*

Succinea crassinuclea (Benson), Pfeiffer, Zeits. Malak. vi, 1849, p. 110.
Succinea crassiuscula, Pfeiffer, Mon. Helic. Viv. iii, 1853, p. 9; Reeve, Conch. Icon. xviii, 1872, *Succinea*, pl. 1, fig. 4; Hanley

& Theobald, Conch. Ind. 1874, pl. 68, figs. 5, 6; Nevill, Hand List, i, 1878, p. 212.

Succinea (Tapada) crassiuscula, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 412.

Original description :—" T. ovato-conica, solida, striata, punctis impressis notata, vix nitidula, corneo-albida; spira scalaris, papillata; anfr. 3, penultimus perconvexis, ultimus inflatus, rotundatus, $\frac{2}{3}$ longitudinis aequans; columella subcallosa, arcuatim recedens; apertura lata, ovalis, intus margaritacea; perist. simplex, obtusum, margine dextro regulariter arcuato.

" Long. 9, diam. 7, alt. 4 mill. Apert. $6\frac{1}{3}$ mill. longa, $4\frac{1}{2}$ lata." (*Pfeiffer.*)

Hab. India: Bundelkhund (*Theobald*); Calcutta and Port Canning (*Nevill*); Salt Range and Kutch (*Stoliczka*).

The species was originally published as *S. crassinuclea*, from a Cuming label, but four years later Pfeiffer altered it to *crassiuscula*, as communicated to him in a letter by Benson, and the latter name has been adopted by every subsequent author dealing with the species.

The shell is of a delicate whitish corneous appearance and more or less connects *S. daucina* with *S. vitrea*. I have seen several specimens which exceed the type in diameter, one in the Cuming collection and four, presented to the National collection by Hutton, measuring 10 mm., while the Theobald collection contains shells which even attain 11 and 12·5 mm. in diameter. On the other hand, specimens presented by Colonel Wilmer, who collected them at Fort William, Calcutta, although full-grown, only measure 6·5 mm.

452. **Succinea vitrea**, *Pfeiffer.*

Succinea vitrea, Pfeiffer, P. Z. S. 1854, p. 298; ibid., Mon. Helic. Viv. iv, 1859, p. 810; Reeve, Conch. Icon. xviii, 1872, *Succinea*, pl. 3, fig. 20; Hanley & Theobald, Conch. Ind. 1874, pl. 68, figs. 2, 3; Nevill, Hand List, i, 1878, p. 214; Smith, Fauna and Geogr. Maldive & Laccadive Arch. i, part 2, 1902, p. 142; Peile, Journ. Bombay Nat. Hist. Soc. xi, 1908, p. 131.

Succinea (Tapada) vitrea, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 412.

Original description :—" S. testa ovato-conica, tenuiuscula, confertim plicato-striata, nitida, albo-hyalina; spira conica, subpapillata; anfr. 3 convexis, ultimo $\frac{2}{3}$ longitudinis formante, inflato, basi attenuato; columella filosa, arcuata; apertura parum obliqua, incumbente, ovali, superne vix angulata; perist. simplice, marginibus callo opaco junctis, subsymmetricis.

" Long. 12, lat. 8, alt. 5 mill." (*Pfeiffer.*)

Hab. India: Calcutta (*Bacon*); Fort William, Calcutta (*Wilmer*); Bombay Island (*Peile*). Andaman Islands, Fort William (*Wilmer*). Laccadive Archipelago (*Stanley Gardiner Expedition*).

Mr. Smith considers this species " scarcely separable from

S. crassiuscula, Benson." It certainly approaches that species in several respects, bnt the last whorl does not increase so rapidly and the spire is more produced.

Several specimens from Bombay measure 13·5 mm. in diameter thus exceeding the type which is in the Cuming collection. Three shells from Calcutta in the Theobald collection also have a diameter of 13 mm. On the other hand three specimens in the British Museum collected in 1880 by Col. Wilmer on brickwork at Fort William, Andaman Islands, which I refer to this species, do not exceed 9 mm. and a still smaller form, collected by him at Fort William, Calcutta, only measure 6·5 mm. The shells collected by the Stanley Gardiner Expedition, in the Maldive gronp—which are also in the British Museum—belong to a rather slender form, pale greenish corneous, and almost transparent.

453. **Succinea hanleyi**, sp. n.

Succinea subgranosa, Hanley & Theobald, Conch. Ind. 1876, pl. 158, fig. 9 (non Pfeiffer).

Shell imperforate, elongate-conoid, finely and closely, somewhat irregularly, plicate-striate, pale amber coloured. Spire elongate, apex minutely papillate, suture moderately deep. Whorls $3\frac{1}{4}$, rather tumid, the last about $\frac{4}{7}$ of the total length of the shell. Aperture oblique, obovate, the margins slightly thickened, columellar margin shortly reflexed, with a slight elongate tubercle at the junction with the basal margin.

Long. 7, diam. 4, alt. 3·5 mm.; apert. 4 mm. long, 3 mm. broad.

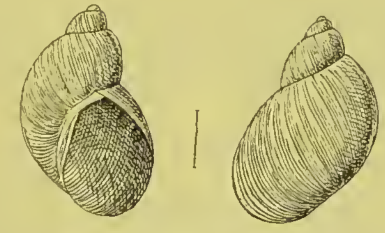
Fig. 141.—*Succinea hanleyi.*

Hab. India: Calcutta.

Type in the British Musenm.

The British Museum contains four specimens from Calcutta labelled *Succinea subgranosa*, but which differ from that species by the more slender spire and in being of a pale amber colour. The new species has also some relationship with *S. bensoni*, but the aperture is less high in proportion to the spire. One of the specimens has $3\frac{1}{2}$ whorls completed and measures nearly 8 mm. in length. The shell figured in Conch. Ind. I also refer here.

454. Succinea subgranosa, *Pfeiffer*.

Succinea subgranosa, Pfeiffer, P. Z. S. 1849, p. 132; ibid., Mon. Helic. Viv. iii, 1853, p. 9; ibid., Conch.-Cab., *Succinea*, 1855, p. 41, pl. 4, figs. 12–14; Reeve, Conch. Icon. xviii, 1872, *Succinea*, pl. 4, fig. 24; Nevill, Hand List, i, 1878, p. 212.
Succinea (*Tapada*) *subgranosa*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 412.

Original description:—" S. testa elliptico-ovata, tenui, subgranulato-striata, diaphana; parum nitida, pallide cornea; spira brevi, obtusiuscula; anfractibus vix 3 convexis, ultimo basi attenuato; columella substricte recedente, superne leviter callosa; apertura parum obliqua, subangulato-ovali, intus nitidissima, peristomate simplice, acuto, margine dextro mediocriter arcuato.

" Long. $8\frac{1}{2}$, diam. 5, alt. fere 4 mill.; ap. 6 mill. longa, 4 lata." (*Pfeiffer*.)

Hab. India: Kurnool; Bombay (*Fairbank*); Kutch (*Stoliczka*); Calcutta (var. β. ventrosior, albida, *Pfeiffer*).

The present species approaches some forms of *S. crassinuclea*, but has a shorter spire and is less translucent. The Cuming collection contains specimens bearing a label in Pfeiffer's handwriting. These have a slightly more slender spire than the figure in the Conch.-Cab., but the shell illustrated by Hanley and Theobald in Conch. Ind. is altogether different and pertains to the new species described, *supra*.

455. Succinea bensoni, *Pfeiffer*.

Succinea bensoni, Pfeiffer, P. Z. S. 1849, p. 133; ibid., Mon. Helic. Viv. iii, 1853, p. 9; ibid., Conch.-Cab., *Succinea*, 1855, p. 46, pl. 4, figs. 41–43; Reeve, Conch. Icon. xviii, 1872, *Succinea*, pl. 1, fig. 7; Hanley & Theobald, Conch. Ind. 1874, pl. 67, fig. 9.
Succinea (*Tapada*) *bensoni*, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 412.

Original description.—" S. testa ovato-conica, tenui, regulariter confertim striata, pellucida, sericina, luteo-cornea; spira conica, acutiuscula; anfractibus 3, penultimo convexiusculo, ultimo $\frac{2}{3}$ longitudinis æquante; columella callo tenui induta, vix arcuata, recedente, apertura ovali; peristomate tenui, margine dextro mediocriter arcuato.

" Long. 8, diam. 5, alt. $3\frac{1}{2}$ mill.; ap. 5 mill. longa, 3 lata." (*Pfeiffer*.)

Hab. India: Moradabad (*Benson*).

This species is allied to *S. hanleyi*. A small form, measuring 6·5 mm. in length, from the type locality, is in the Cuming collection. The shells, five in number, are accompanied by a label in Pfeiffer's handwriting.

456. **Succinea ceylanica**, *Pfeiffer.*

Succinea ceylanica, Pfeiffer, P. Z. S. 1854, p. 297; ibid., Mon. Helic. Viv. iv, 1859, p. 810; Nevill, Enum. Helic. Ceylon, 1871, p. 3; Hanley & Theobald, Conch. Ind. 1876, pl. 158, fig. 10; Nevill Hand List, i, 1878, p. 212; Godwin-Austen, P. Z. S. 1895, p. 443 (var.).

Succinea (Tapada) ceylanica, Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 413.

Neritostoma ceylanicum, Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 269.

Original description :—"S. testa ovato-conica, solidula, distincte striata, diaphana, hyalino-albida, plerumque luto obducta; spira conica, submucronata; anfract. 3 cum apice punctiformi, superis convexis, ultimo $\frac{3}{5}$ longitudinis formante, basi parum attenuato; columella angulatim a ventre anfractus penultimi recedente, substricta; apertura obliqua, angulato-ovali; perist. simplice, margine dextro regulariter arcuato.

"Long. $7\frac{1}{2}$, lat. 4, alt. $3\frac{1}{2}$ mill." (*Pfeiffer.*)

Hab. Ceylon (*Layard*); Kandy (*Nevill*). Nicobar Islands: Batte Malve (var. *Godwin-Austen*).

Three shells, collected by Layard, with Pfeiffer's label are in the Cuming collection. These are probably part of the original consignment, but none of them can be the type as they measure only $6{\cdot}75 \times 4 \times 3{\cdot}5$ mm.

Genus **LITHOTIS**, *Blanford.*

Lithotis, Blanford, A. M. N. H. ser. 3, xii, 1863, p. 186 (as subgenus of *Succinea*); Bland & Binney, Ann. Lyc. Nat. Hist. New York, x, 1874, p. 346 (jaw and radula); Binney, Proc. Acad. Nat. Sci. Philadelphia, 1874, p. 54, pl. 5, figs. 3–6 (jaw and radula of *L. rupicola*); Fischer, Man. Conchyl. 1883, p. 492 (as genus).

TYPE, *Succinea* (*Lithotis*) *rupicola*, Blanford.

Range: Central India.

Shell auriculate-ovate, thin, with a very short spire, a supraperipheral keel extending from the apex to the aperture, with a corresponding furrow internally; whorls $1\frac{1}{4}$–$2\frac{1}{2}$; aperture large, ovate; peristome simple, acute.

Bland and Binney have examined the jaw and radula of *L. rupicola* and state that the former is "arcuate, with a depression or excavation at the centre of its upper margin; scarcely attenuated towards the ends; cutting edge with a decided median projection; anterior surface with vertical striæ, but no trace of ribs."

The lingual ribbon they find "as usual in the Helicinæ, the marginal teeth being quadrate, not aculeate. The centrals are long and narrow, with lateral expansions at the lower margin; the reflected portion has one stout median cusp with a point

reaching nearly to the lower margin of the tooth, the side cusps being subobsolete. The lateral teeth are like the centrals but unsymmetrical. The marginal teeth are about as wide as high, with one stout, pointed inner cusp, and two short side cusps."

The genus is confined to Central India, and only two species are known. Although Blanford only regarded it as a subgenus of *Succinea*, I consider, apart from the totally different build of the shell, the presence of an internal furrow for a siphon sufficient warrant to rank it as a separate genus, as was done by Fischer.

457. **Lithotis rupicola**, *Blanford*.

Succinea (*Lithotis*) *rupicola*, Blanford, A. M. N. H. ser. 3, xii, 1863, p. 186, pl. 4, figs. 8–10; Nevill, Hand List, i, 1878, p. 214.

Succinea rupicola, Pfeiffer, Novit. Conch. ser. 1, iv, 1871, p. 11, pl. 112, figs. 1–4; ibid., Mon. Helic. Viv. vii, 1876, p. 35.

Lithotis rupicola, Bland & Binney, Ann. Lyc. Nat. Hist. New York, x, 1874, p. 349 (jaw and lingual dentition, description); Binney, Proc. Acad. Nat. Sci. Philadelphia, 1874, p. 54, pl. 5, figs. 3–6 (jaw and lingual dentition, figures); Hanley & Theobald, Conch. Ind. 1874, pl. 81, fig. 7; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 231; Tryon, Struct. Syst. Conch. iii, 1884, p. 88, pl. 100, fig. 40.

Original description:—"Testa ovata, pertenuis, succinea, curvate costulato-striata; spira plana, sutura vix depressa; anfractibus $1\frac{1}{4}$, ultimo prope aperturam descendente; carina ex apice oriens, spiralis, peristomatis ad marginem dextrum, 2 mm. a sutura, desinens; apertura permagna, ovata, continua, intus politissima, nitida; peristomate tenue, rectum, margine columellari callose appresso.

"Diam. maj. 7 mill., min. 5, alt. $2\frac{1}{2}$." (*Blanford*.)

Hab. India: Western Ghats; Khandala (*Blanford*).

"Combines the characters of *Camptonyx* and *Otina*, belonging to the *Auriculacea*, with those of *Succinea* and its allies. From the shell alone, which has the form of *Otina*, with the substance, texture, and peculiar external ridge and internal furrow of *Camptonyx*, I should have supposed the present species to belong to the last named genus; but the retractile eye-bearing peduncles prove its place to be in the neighbourhood of *Succinea*, from which genus the internal furrow for a siphon distinguishes it as a well-marked subgenus. Tentacles are extremely small and rudimentary in several of the subgenera of *Succinea*, and, in the present case, appear to be wanting; if present, they are certainly very inconspicuous. The animal of *Helisiga*, Less., as represented in Adams, Gen. Rec. Moll. pl. 73, closely resembles that of *Lithotis*, but has a larger foot, while the shell only differs in the absence of the siphonal furrow.

"*Lithotis* abounds adhering to the precipitous basaltic rocks of the

Western Ghats, like *Cremnobates*, but apparently in more exposed situations, being perhaps more purely an air-breather, and requiring less moisture than its congener. Both probably feed upon the confervoid vegetation covering the surface of the rocks to which they adhere." (*Blanford.*)

Four shells from Bhor Ghat, presented by A. A. West to the National Collection, only measure 6·25 mm. in diameter, but three specimens from Khandala, near Bombay, presented by Dr. A. H. Leith, are considerably larger than the type, their dimensions being 9 × 6·5 × 3·5 mm. The same measurements are attained by four shells from Sinhgarh Hill, Poona, in the Theobald collection.

A very depressed form without any spire, a feature by which it principally differs from *L. tumida*.

458. **Lithotis tumida**, *Blanford.*

Succinea (*Lithotis*) *tumida*, Blanford, J. A. S. B. xxxix, 1870, p. 23, pl. 3, fig. 24; Nevill, Hand List, i, 1878, p. 214.
Succinea tumida, Pfeiffer, Novit. Conch. ser. 1, iv, 1871, p. 12, pl. 112, figs. 6–7; ibid., Mon. Helic. Viv. vii, 1876, p. 35.
Lithotis tumida, Hanley & Theobald, Conch. Ind. 1874, pl. 81, figs. 8, 9; Pfeiffer & Clessin, Nomencl. Helic. Viv. 1881, p. 231.

Original description:—"Testa ovata, oblique elliptica, tenuis, rubello-cornea, parum nitida, oblique striata; spira brevi; apice papillari; sutura profunda. Anfr. 2–2½ tumidi, lira infra-suturali obtusa, antice in exemplis veteribus aliquando fere obsolescenti. Apertura obliqua, magna, ovalis, postice non angulata; peristoma tenue, rectum, continuum, margine columellari tenuiter calloso, appresso.

"Long. 6½, diam. 5, alt. 3, ap. long. 5½, diam. vix 4 millim." (*Blanford.*)

Hab. India: Sinhgarh, Poona (*Blanford*).

"This is a second species of the remarkable sub-genus *Lithotis*, much more tumid than the type *Succinea* (*Lithotis*) *rupicola*, and with a proportionally more developed spire; it serves to connect that form with the typical rock inhabiting *Succineæ* of Western India, such as *S. girnarica*, Theobald, and a new species from Mahableshwar, the animal of which is very similar to that of *Lithotis*.

"The specimens figured are not the largest that have been found. Major Evezard possesses shells from Poorundhur measuring 9 millimetres in length, 6 in diameter, and 4 in height (when laid with the aperture downwards). In these the sculpture is much less regular and weaker than in the accompanying figure which represents a young specimen. The largest Singhur [Sinhgarh] specimen in the same collection measures 8, 6, and 3½ millimetres in its three dimensions, the aperture being 6 mill. by 4." (*Blanford.*)

Var. **subcostulata**, *Blanford*.

Blanford, tom. cit., p. 23; Pfeiffer, Novit. Conch. ser. 1, iv, 1871, p. 13, pl. 112, fig. 5; Theobald, Cat. Land and Freshw. Shells Brit. India, 1876, p. 32.

"Costulato-striata, lira infra-suturali validiori." (*Blanford*.)

Hab. India: Poorundhur.

Differs from *L. rupicola* principally by the raised spire, but the siphonal furrow is less pronounced than in its ally.

The British Museum contains three specimens from the collection of H. Adams, which are smaller than the type, since they only measure 5 × 3·75 × 1·75 mm. On the other hand, four shells in the Cuming collection, without indication of habitat, are 7 mm. in length.

Genus **CAMPTOCERAS**, *Benson*.

Camptoceras, Benson, Calcutta Journ. Nat. Hist. iii, 1843, p. 465; A. M. N. H. ser 2, xv, 1855, p. 10; Adams, Gen. Rec. Moll. ii, 1855, p. 258; Godwin-Austen, Quart. Journ. Geol. Soc. London, xxxviii, 1882, p. 220; Fischer, Man. Conchyl, 1883, p. 511.

TYPE, *C. terebra*, Benson.

Range: India.

Shell sinistral, imperforate, elongate-elliptic, spire solute, apex somewhat acute, suture widely and deeply excavated. Whorls 3–4, narrow, elongated, keeled above and below, flattened, apical whorl elongate-acuminate, exserted. Aperture solute, entire, large, not equalling the spire, elongate-elliptic, narrow above, arcuately angulated above and below. Peristome acute.

Animal with two filiform, obtuse tentacles. Eyes large, placed between the tentacles. Mantle not extending beyond the lips of the shell. Foot short, scarcely exceeding the length of the aperture.

Anatomy unknown.

Considerable difference of opinion appears to exist regarding the systematic position of this genus. Benson considered it to be intermediate between *Limnæa* and *Ancylus*, while Nevill was convinced, from the recorded habitat, as well as from the characters of the shell itself, that it would prove to be a sinistral form, closely allied to *Succinea*. Chenu and Fischer, on the other hand, placed it near *Physa*. The animal unfortunately has never been examined anatomically, and the point can consequently not be definitely settled. I am inclined to favour Nevill's views and therefore retain it in the family Succineidæ.

In 1882 Lieut.-Colonel Godwin-Austen referred a fossil form from the Eocene, found at Sheerness, to the present genus *. The piece of rock containing these fossils, several in number, now

* *Camptoceras priscum*, Quart. Journ. Geol. Soc. London, xxxviii, 1882, p. 220. pl. 5, figs. 1–5, and var. *obtusum*, pl. 5, figs. 6, 7.

being in the British Museum. I have been able to subject them to a careful scrutiny, and I must admit a remarkable resemblance between the two Indian species—*C. terebra* and *C. austeni*—and the British fossil form. Whether this is simply a case of convergence or actual affinity can of course never be determined. In spite of the weight of opinion—that of Dr. Henry Woodward as well as Godwin-Austin's—in favour of the latter, I am inclined to attribute it to the former.

459. Camptoceras terebra, *Benson.*

Camptoceras terebra, Benson, Calcutta Journ. Nat. Hist. iii, 1843, p. 465; ibid., A. M. N. H. ser. 2, xv, 1855, p. 10, text-fig.; Adams, Gen. Rec. Moll. ii, 1855, p. 258, pl. 84, fig. 1; Chenu, Man. Conchyl. i, 1860, p. 481, fig. 3544; H. F. Blanford, J. A. S. B. xl, 1871, pp. 39, 40, pl. 2, fig. 1; Hanley & Theobald, Conch. Ind. 1876, pl. 158, figs. 1, 2; Godwin-Austen, Quart. Journ. Geol. Soc. London, xxxviii, 1882, pl. 5, fig. 8; Fischer, Man. Conchyl. 1883, p. 511; Tryon, Struct. Syst. Conch. iii, 1884, p. 104, pl. 100, fig. 35; Cooke, Cambridge Nat. Hist. iii, 1895, p. 302, fig. 202 B.

Original description:—"Testa diaphana, elongata, anfractibus tribus compressis, biangulatis, transverse striolatis, lineis longitudinalibus depressis decussatis. Animali fuscato, versus spiram rubescente." (*Benson.*)

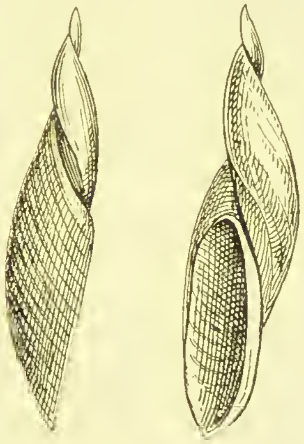

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Fig. 142.—*Camptoceras terebra.*
(Copied from J. A. S. B.)

This short description was subsequently amended by Benson in 1855, in the 'Annals and Magazine of Natural History,' as follows:—"Testa elongato-elliptica, hyalina vel albido-cornea, lineis spiralibus exiguis, vix elevatis, striis obliquis confertissime

decussatis; apertura verticali, elliptica; peristomate acuto, vix expansiuscula.

"Long. vix 9, plerumque 6 ad 7 mill. Diam. 3 mill. longa, apert. exempl. majoris 4 mill."

Hab. India: Moradabad, Rohilkhund (*Bacon*).

"Animal. Tentaculis duobus filiformibus, obtusis, oculis majoris inter tentacula sitis, proboscideque mediocri munitum; pallio labia testæ haud transeunte; pede brevi, longitudinem aperturæ vix superante.

"The form of the tentacles and the position of the eyes, situated between the filiform tentacles and sessile on the head (not as in *Lymnæa* occupying the fore part of the widened base of the triangular tentacles) at once distinguishes the animal from that of *Lymnæa*. In *Camptoceras* the eyes are large in proportion to the size of the animal. Shell very local." (*Benson.*)

Although the species appeared to be sufficiently plentiful when first found—some forty specimens being taken by Bacon and Benson—their subsequent searches for it proved fruitless, and it is apparently rare in collections. I have not seen the species.

460. Camptoceras austeni, *H. F. Blanford.*

Camptoceras austeni, H. F. Blanford, J. A. S. B. xl, 1871, p. 40, pl. 2, fig. 2; Hanley & Theobald, Conch. Ind. 1876, pl. 158, figs. 3, 4; Nevill, Hand List, i, 1878, p. 215; Godwin-Austen, Quart. Journ. Geol. Soc. London, xxxviii, 1882, pl. 5, fig. 9.

Original description:—"Testa sinistrorsa, elongato, albido-cornea, epidermide tenui induta, striis spiralibus et transversis minutissime obliquiter decussata. Spira elongato acuminata. Apex acutiusculus. Anfractus 2, soluti. Apertura subobliqua, regulariter ovalis, superne haud complanata. Peristoma integrum, continuum, fusco-marginatum.

"Alt. 3·75, diam. 1 mm. Aperturæ alt. 1·6, diam. 0·9 mm."

Hab. India: Nazirpur, Mymensing Prov., Dacca (*Godwin-Austen*).

"In form this species closely resembles *C. terebra*, Bens., but is distinguished by its much smaller size, the smaller number of its whorls, and especially the regular oval form of its aperture; that of *C. terebra* being much flattened on the inner upper margin. Other differences are presented by the specimen of the latter species here figured and which I received some years since from the late Mr. Benson. The aperture of *C. terebra* is equal to more than half the length of the shell, while that of *C. austeni* is less than half the same length; the proportions in the former case, as determined by accurate measurement, being 53 per cent., in the latter 42 per cent. My specimen of *C. terebra* is probably not full-grown, since it has but $2\frac{1}{2}$ whorls, and the margin of the peristome is sharp, unlike that of the specimens both of *C. austeni* and the following species. All the specimens of these exhibit a

thickening of the epidermis around the peristome, which I consider characteristic of the full-grown shell. *C. austeni* would appear to be rare at the locality, since only five specimens were found among a large number of the following species. It is possible, however, that it may have been overlooked, owing to its smallness." (*H. F. Blanford.*)

Both this species and *C. lineatum* were found together by Lieut.-Col. Godwin-Austen, adhering to plants in a dried-up lake.

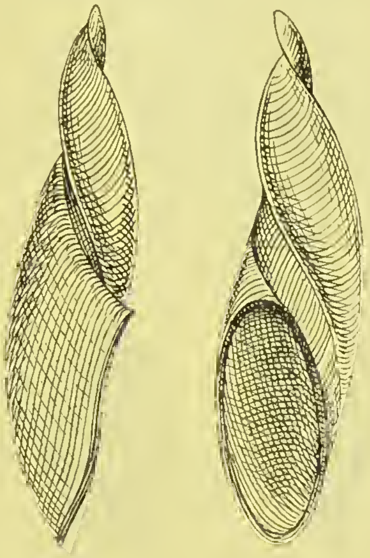

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Fig. 143.—*Camptoceras austeni.*
(Copied from J. A. S. B.)

A specimen, presented in 1909 by the late W. T. Blanford to the British Museum, is from the original locality, but as it only measures 3×0·75 mm. it cannot be the type. The same remark applies to a shell in the Godwin-Austen collection (British Museum), which, although labelled type, only measures 3 mm. in length. A second shell, which only attains 2·4 mm. in length, is provided with an epiphragm, a fact which confirms my surmise that *Camptoceras* is a genus of land mollusca.

461. **Camptoceras lineatum**, *H. F. Blanford.*

Camptoceras? lineatum, H. F. Blanford, J. A. S. B. xl, 1871, p. 40, pl. 2, fig. 3.
Camptoceras lineata, Hanley & Theobald, Conch. Ind. 1876, pl. 158, figs. 5, 6.
Camptoceras lineatus, Nevill, Hand List, i, 1878, p. 215.

Original description:—"Testa elongato-ovata, sinistrorsa, albido cornea; epidermide tenui induta; lineis elevatis, fuscis, æquidistantibus, spiralibus ornata; interspatiis minute decussatis. Spira valde exserta. Apex acutiusculus. Anfractus $2\frac{1}{2}$, approximati, attingentes; ultimus pone aperturam omnino solutus. Apertura subobliqua, ovalis, superne subcomplanata. Peristoma continuum, integrum, fusco-marginatum.

"Alt. 4·5 mm.; diam. 2·3 mm. Aperturæ alt. 3·5, lat. 1·7 mm." (*H. F. Blanford.*)

Hab. India: Nazirpur, Mymensing Prov., Dacca (*Godwin-Austen*).

"It is not with entire confidence that (not having seen the animal) I attribute this species to the genus *Camptoceras*, since it differs from the typical species in having the whorls contiguous, except behind the peristome. In most specimens that I have examined, little more than the peristome is free, but in one or

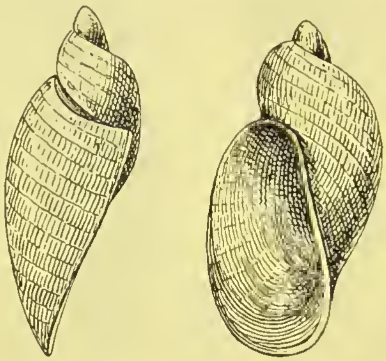

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Fig. 144.—*Camptoceras lineatum.*
(Copied from J. A. S. B.)

two, at least a quarter of the last whorl is not in contact with the penultimate whorl, as may be seen if the shell be held up to the light or over a sheet of white paper in a proper position. The character of the peristome and of the shell surface closely resemble those of the more typical species of *Camptoceras*, and that the habits of the animal are similar may be inferred from its association with the preceding species [*C. austeni*]. As far as can be judged, therefore, the evidence is preponderant in favour of this generic alliance I have adopted. Perhaps it may not be irrelevant to add that no species of *Physa* has yet been discovered in India" (*H. F. Blanford.*)

Two shells from the original locality, in the Godwin-Austen collection (British Museum), are marked "type." One of these shows the remains of an epiphragm. Three other shells only

measure 2·4×1·5 mm. One of these has the second whorl solute.

I found a series of twelve specimens from the original locality in the British Museum, presented in 1909 by the late W. T. Blanford. The largest of these only measures 3·5×2 mm., and is therefore smaller than the type.

The species is included in *Camptoceras* with some doubt, it differs considerably in several characters from the other two known species. Benson himself had some misgivings on the subject. I do not, however, think it advisable, without anatomical data to guide us, to establish a separate genus.

Genus **CAMPTONYX**, *Benson.*

Camptonyx, Benson, A. M. N. H. ser. 3, i, 1858, p. 336, pl. 12, figs. 1–6 (shell and animal), fig. 7 (jaw and radula); Stabile, Atti Soc. Sci. Nat. Milano, vii, 1864, p. 122; Nevill, Hand List, i, 1878, p. 215; Blanford, J. A. S. B. xlix, 1880, p. 200, footnote; Fischer, Man. Conchyl. 1883, p. 502; Tate, in Woodward, Man. Moll. appendix, 1890, p. 43; Cooke, Cambridge Nat. Hist. iii, 1895, pp. 302, 438.

Type, *C. theobaldi*, Benson.

Range: India.

Shell pileiform, obliquely conical, reddish brown; apex subspiral, free, obliquely incurved, turned towards the right side; whorls $1\frac{1}{2}$, the last almost constituting the entire shell; a dorsal rib, resembling an obtuse subspiral keel and corresponding interiorly to a siphonal furrow, runs from the apex to the right margin; aperture large, symmetrical, regularly ovate, margins expanded.

Fischer in 1858 * united *Camptonyx* with *Valenciennesia*, a genus of fossil species occurring in Miocene beds in the Crimea, Turkey, Roumania, Croatia, Slavonia, and Hungary, but subsequently in his "Manuel" he modified his views so far as to separate the two, although still regarding them as closely allied. With all due deference to so eminent an authority, I am unable to concur in his view, for, although undoubtedly having some features in common, the mere fact of *Camptonyx* being furnished with a spirally convoluted apex, while *Valenciennesia* has a non-spiral apex, apart from the enormous difference in size, militates against the assumption of close affinity.

462. **Camptonyx theobaldi**, *Benson.*

Camptonyx theobaldi, Benson, A. M. N. H. ser. 3, i, 1858, p. 336, pl. 12, figs. 1–6 (shell and animal), fig. 7 (jaw and radula); Adams, Gen. Rec. Moll. ii, 1858, p. 644, pl. 138, fig. 10; Hanley

* Journ. Conchyl. vii, 1858, p. 316.

& Theobald, Conch. Ind. 1874, pl. 81, figs. 5, 6; Tryon, Struct. Syst. Conch. iii, 1884, p. 98, pl. 103, fig. 4; Nevill, Hand List, i, 1878, p. 215; Tate in Woodward, Man. Moll. 1890, appendix, p. 43; Cooke, Cambridge Nat. Hist. iii, 1895, p. 302, fig. 202 c.
Valenciennesia theobaldi, Fischer, Journ. Conchyl. vii, 1858, p. 319.

Original description:—"Testa (supina) cornucopiam simulante, tenui, concentrice rugosa, purpureo-fusca, dorso ad latus sinistrum compressiusculo, costa carinæformi subspirali, sulco postico adjecto, ab apice usque ad marginem dextrum aperturæ descendente; apice obtuso; apertura ovali, intus purpureo-lutescente, nitida, peristomate acuto.

"Long. 10, diam. dorsali $4\frac{1}{2}$ mill.; apert. 8 mill. longa, 6 lata." (*Benson.*)

Hab. India: Girnar Hills, Peninsula Guzerat (*Theobald*).

"This singular shell, sent to me by Mr. W. Theobald, Jr., as a cap-shaped *Succinea*, was found by him in abundance on the central peak of Mount Girnar in Kattiwar, on the peninsula which separates the Gulfs of Cutch and Cambay. He states that these hills form an amphitheatre, with a central crateriform clump, the peak rising to an altitude of 2500 feet.

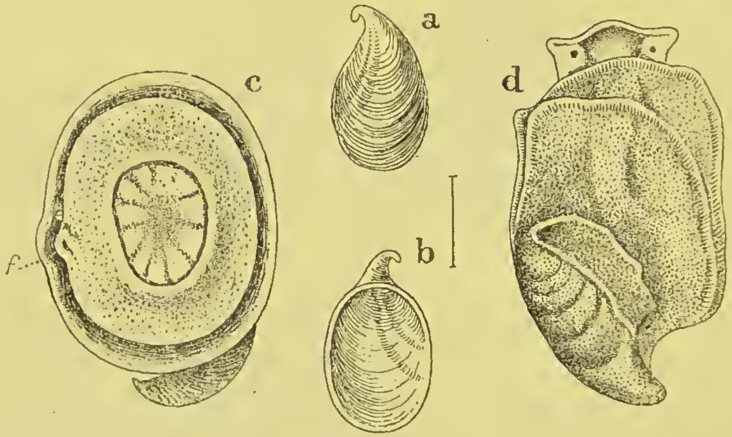

Fig. 145.—*Camptonyx theobaldi* (all enlarged).
(Copied from J. A. S. B.)

"A piece of the weathered rock forwarded by him contains in a space of 2 inches square twenty-six young individuals, adhering most tenaciously to the surface like limpets or *Ancyli*." (*Benson.*)

Benson thought it probable "that *Camptonyx* holds an intermediate place between *Testacella*, *Plectrophorus*, and *Succinea*, and that it bears the same relation to the latter that *Ancylus* does (through the intermediate Indian genus *Camptoceras*) to *Lymnæa*.

"The external rib and furrow on the shell have a corresponding depression and ridge internally, but they are less strongly marked. In the animal the sole is oblong, of a pale colour, transversely

corrugated, and surrounded on all sides by a thick greyish hyaline mantle, which completely hides the sole during æstivation, exuding a gluten, most tenacious when dried.

"Mr. Theobald was doubtless justified, by the situation in which he found his specimens, on a high peak, where the drought at the time of his visit had driven the largest example of a gigantic *Succinea* into inaccessible crevices in the rock, in attributing terrestrial habits to the animal."

Mr. S. P. Woodward writes (*l. c.* p. 338):—"The respiratory orifice is quite on the edge of the mantle. The tentacles are rather conical than angular, and the mouth appears to me rather peculiar, unlike *Physa* and *Lymnæa*. The upper mandible is conspicuous, slightly lobed, but destitute of the ridges seen in the HELICIDÆ and of the lateral elements which are added in *Lymnæa*. The lingual ribbon is ·036 long and ·014 wide with 86 rows of teeth, 87 in a row $\frac{43.1.43}{86}$; they have simple obtuse hooks, as in *Ancylus*; the central row only differs in being symmetrical; the laterals diminish gradually from the 14th to the 43rd, and a second (outer) cusp makes its appearance, and increases until the three near the margin are regularly bicuspid. The tongue is more like *Ancylus* than any other, but differs from it in the absence of those unarmed marginal plates which give a peculiar appearance to the lingual ribbon of *Ancylus* and are still more conspicuous in *Velletia*."

The British Museum contains five specimens, labelled "Kattiwar," the largest of which measures: long. 6·5, alt. 2·5 mm., apert. 5·5 × 4·25 mm. The shell figured in Conch. Ind. is also in the British Museum, having been presented, together with two others, by Mr. Harvey.

SLUGS.

It has been found convenient to deal with the land slugs collectively. For their systematic position reference should be made to the systematic index at the commencement of this volume.

Family ARIONIDÆ.

Subfamily ARIONINÆ.

Genus **ANADENUS**, *Heynemann.*

Anadenus, Heynemann, Malak. Blätt. x, 1863, p. 138; Godwin-Austen, Moll. India, i, 1882, p. 46.

Original description (in German) :—" Anadenus (without tail gland). Body fused with the sole for the whole length. Mantle covering the anterior part of the body. Respiratory orifice placed behind the middle of the right side of the mantle. Genital orifice behind the right upper tentacle. Two upper and two lower retractile tentacles. Back flatly convex (without keel, without tail-gland). Sole tripartite. Jaw with close transverse ribbing. The curve of the transverse rows of the radula practically in a plane. Tooth-plates rectangular with projecting sides. Central tooth unilateral, triangular with lateral spines. Laterals scarcely differing from central, with a lateral spine on the outer side. Internal shell present, white, calcareous, without epidermis on the margin. Nucleus lateral.

" The animal superficially resembles our German Arions and Limaces. It is related to *Arion,* but only resembles *Limax.* Its relationship with *Arion* is established by the jaw which has transverse ribs as in *Arion empiricorum.* On the other hand it differs in the following particulars :—

Arion.	*Anadenus.*
Caudal gland: present.	absent.
Respiratory orifice: in front of middle of the mantle.	placed further back.
Internal shell: absent. (the mantle contains only scattered calcareous particles).	present, with distinct growth-lines.

" The principal character in which *Anadenus* differs from *Arion* is the absence of the caudal gland; somewhat less weight must

be attributed to the situation of the lung-orifice, as this has not been observed in living specimens. In dead examples of *Anadenus* it is indeed practically in the middle, but the anterior, free, part of the mantle invariably contracts far more than the posterior adherent portion, and since in dead specimens of *Limax*, this opening is likewise in the middle while in the living state it is placed further back, it is not likely to be different in *Anadenus*.

"The new genus is probably nearest to *Geomalacus* occurring in Great Britain, which hitherto I have not had an opportunity of examining, but from which it may be distinguished by the following characters:—

Geomalacus.	*Anadenus.*
Tail portion: round.	pointed.
Respiratory orifice: at the middle of the mantle.	behind the middle.
Caudal gland: present.	absent.
Internal shell: absent.	present.

"Although similar, not only in general form, but also as regards the position of the respiratory and genital orifices, as well as in the presence of an internal shell, it must not be confounded with *Limax*, for in addition to the difference in the jaw, it is distinguished by the form of the tail portion which, in *Limax*, is invariably keeled while in *Anadenus* it is without any trace of keel.

"If we could only observe living specimens or obtain an accurate description of them, undoubtedly further differentiating characters between similar or allied forms would be found, such as the shape of the rugæ of the mantle and of the body.

"As I have already observed on a former occasion, in dead specimens the wave-like rings on the mantle of *Limax* disappear. Nor can it be stated whether the mantle of *Anadenus* is granulated as in *Arion*, *Amalia*, and *Geomalacus*, or whether it has the well-known structure of *Limax*. The rugæ on the back likewise become depressed and no accurate description of them can be made from spirit-specimens; yet, it is evident from the illustration, which I give of the skin of the back of a dead *Anadenus*, that it really differs from all known forms. A furrow runs along the middle of the back, from which lateral furrows, obliquely directed backwards, branch off. The areas enclosed by these furrows are covered with a double row of irregularly diverging rugæ."

The only extralimital species known is *A. sinensis*, Möllendorff *, from Se-Chuen.

* Ann. Mus. Zool. Acad. Imp. Sci. St. Petersburg, iv, 1899, p. 49.

463. **Anadenus altivagus**, *Theobald.*

Limax altivagus, Theobald, J. A. S. B. xxi, 1862, p. 489.
Anadenus altivagus, Theobald, Cat. Land and Freshw. Shells Brit. India, 1876, addenda, p. i; Nevill, Hand List, i, 1878, p. 65: Theobald, J. A. S. B. l, 1881, p. 47; Godwin-Austen, Moll. India, i, 1882, p. 49, pl. 6, fig. 1 (animal), figs. 2–7 (anatomy), pl. 7, fig. 1 (shell), figs. 5, 6 (anatomy); Tryon, Man. Conch. ser. 2, i, 1885, p. 249, pl. 59, fig. 62 (animal); Pilsbry, Proc. Malac. Soc. London, iii, 1898, p. 95, pl. 7, figs. 1–3, 5–7 (anatomy).
Anadenus (*Altivagus*) *altivagus*, Cockerell, The Conchologist, ii, 1893, p. 192.

Original description:—"Corpore limaciformi, pallio lente-granuloso, dorso rugose reticulato, more frondis brassicæ, colore virescente-fusco sive lutescente-fulvo, interdum nigrescente, et rarissime pallide aurantiaco pallio, minus colorato corpore. Tentaculis quatuor nigris, capite nigro, infra pallescente. Ano ad dextrum latus pallii, prope marginem posito, ad mediam partem vix attingente.

"Longitudinis (corpore extenso), 9 unc." (*Theobald.*)

Hab. Cissutlej Hills, near Fagu, Narkanda, Saraon, etc., 6000 to 9000 ft.

"This *Limax* is rather variable in colour, and large specimens, when in motion and extended, exceed 9 inches in length, though their ordinary dimensions is about 6. It feeds on fungi."

Fig. 146. —*Anadenus altivagus.*
(Shell. Copied from Land. and Freshw. Moll. India.)

This somewhat cursory description is amplified by the excellent account given by Godwin-Austen as follows:—

External description of animal (*from spirit specimen*) *collected at Simla*:—"Slug-like, rounded above; foot rather pointed behind; no gland, with a narrow segmented pedal margin. Mantle closely fitted to the foot behind, only slightly overlapping on the sides; the neck-lobes only partially developed near the respiratory orifice, with a fine papillate surface. The respiratory and anal orifices

situated together just above the centre of the mantle-margin. The generative orifice at a moderate distance (about 8 or 10 mm.) behind eye-tentacle.

"Total length 70·0, mantle length 30·0, mantle breadth 20·0 mm.

"Largest spec.: Shell quadrate, flat, thin, horny, white, with concentric lines of growth, nucleus on right central margin.

"Major diam. 15·0 mm., minor 10·0 mm.

"*Odontophore, &c.* The jaw is solid and composed of 13 ribs.

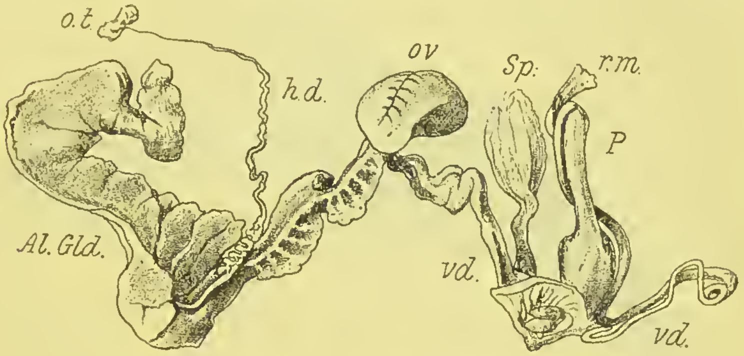

Fig. 147.—*Anadenus altivagus.*
(Genital system. Copied from Land and Freshw Moll. India.)

In the radula the centre tooth is broad, with two small pointed projections at the base; the adjacent laterals are also broad, with

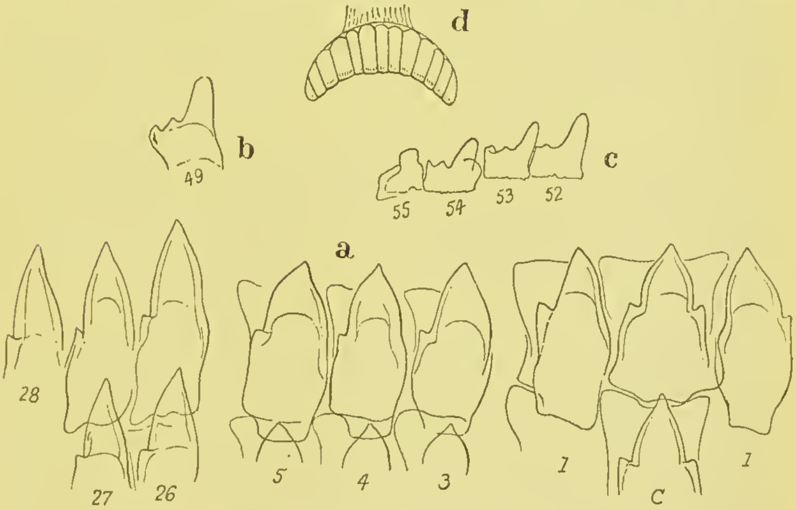

Fig. 148.—*Anadenus altivagus.*
(Jaw and radula. Copied from Land and Freshw. Moll. India.)

a single small blunt tooth on the exterior side; about the 28th from the centre they become much more elongated, and the outer basal

tooth is rather sharper. The outermost laterals are oblong at the base, with one long blunt tooth and one or two small teeth disunited and separate from it, but rising from the same base. These outer teeth are very characteristic of the genus, for nothing like them is to be found in either *Arion* or *Limax*. The teeth of this species do not certainly agree with the radula described and figured by Heynemann; there is a similarity only so far as the straight form of the central teeth; but he distinctly says all the laterals

Fig. 149.—*Anadenus altivagus.*
(Copied from Land and Freshw. Moll. India.)

are straight and with no basal cusp, and he thus figures the 55th of *giganteus*; and the 40th tooth of *A. schlagintweiti* has this small basal tooth, but he adds that on the extreme laterals it disappears. There were 106 rows in a very complete radula I got out arranged thus :—55 . 1 . 55.

"The jaw and radula are found to be like that of *Geomalacus*, to which genus *Anadenus* has, in this respect, some affinity.

"*Generative organs.* The ovotestis is bilobed, and situate quite within the folds of the liver-lobe, and is of a pale green tint; the hermaphrodite-duct is rather long, a good deal convoluted near its lower end, but is straight for a short distance before it joins the albumen-gland; this organ is very large, and lies on the left anterior side of the animal. The oviduct is of the usual form. The vas deferens is given off just above the duct of the spermatheca; it is very long, and is coiled on itself at one point, about the middle of its length; this coil lies well forward on the left anterior side behind the left tentacle, and doubles back on itself, and passing up the side of the male organ enters it at the hard rounded posterior end, close to where the retractor muscle is given off. The attachment of this muscle is at the posterior margin of the mantle-cavity; it is so much contracted in the spirit-specimen as to bring the posterior end of the penis close up to it and the attachments of the eye-tentacles, etc. The spermatheca is about the same length as the penis, pear-shaped.

"All the six specimens sent to me from Simla (where they were collected during the rains in June and July, at the period when they are in full activity and development), show the generative orifice much expanded, with the male organ partly protruding. This discloses the existence of several small, sharp, curved spines fixed upon the surface of this reversed portion. On further opening the generative orifice these curved spines were discovered to be only the most advanced of a much greater number arranged in two parallel rows and extending upwards, gradually lengthening, and forming part of a very complicated and beautiful arrangement of far longer and stronger calcareous spines. The frontal side of this curious apparatus was found covered by a large and longitudinally perforated plate, which had evidently been built up by the union together at their upper and lower extremities of originally parallel spines. On the posterior side of this basal portion of the male organ one very large, long, spear-shaped spine was situated; this measured 8 mm. in length. The whole of this complicated structure must therefore be regarded as representing the simple dart-sac with a single dart, as seen in other genera of the HELICIDÆ, for the fixed position of the bases of these spines in the integument of the lower swollen portion of the male organ precludes the idea of its being a spermatophore. On following the large duct of the penis upwards towards the junction with it of the vas deferens, the end of the penis is seen, occupying the upper swollen portion; so that here we have apparently the penis and the dart-sac almost united together, instead of, as is usual, the dart contained in a distinct and long sac of its own; but this, after all, is only a question of degree, for the transition is seen in such rudimentary pouches of the dart in *Helix pisana* (vide pl. xix, fig. 16, Moquin-Tandon's 'Mollusques de France,' and *Helix bulimoides*, pl. xx.).

"Can it be that in this species the great development of spines and this plate has converted this organ into one of a holding or clipping nature on their interlocking or entanglement prior to, or during the act of copulation? for after expansion or protrusion the muscular contraction would draw these spines together very tightly.

"One of the most interesting points in the anatomy of this species is the relative position of the heart and renal organ, in which respect it has a considerable similarity to what is seen in *Arion* and *Geomalacus*, encircling the heart. The position of the ventricle is, however, different, on the posterior edge of the mantle-cavity and directed backwards; it is large and flatly pearl-shaped.

"The renal organ is ovate and is divided into two portions by a main secretory duct, the inner portion forming a nearly complete narrow disk round the ventricle and commencing from near where the aorta is given off. The renal organ is quite free for three quarters of its anterior margin, the dorsal surface being spread over with the network of the pulmonary veins, the ventral surface

of the pulmonary sac being shown in the figure. The retractor muscles of the eye-tentacles, odontophore, and penis are all situated in a line close together at the posterior margin of the mantle; and in this they are thus somewhat more like *Arion*, only that the muscle of the buccal mass has a more posterior position for its attachment." (*Godwin-Austen.*)

Hab. India: Tandiani (*Theobald*); Changligali, near Murree, Kashmir (*Stoliczka*); Simla (*Godwin-Austen*); Nepal (*Nevill*).

Lieut.-Col. Godwin Austen originally considered *Anadenus giganteus*, Heynemann, the same as Theobald's *altivagus*, the description as regards texture of the epidermis of the mantle and foot agreeing well, although he admitted that specimens of the former (contracted in spirit) measured from 80 to 100 mm. in length, while the shell was 20 mm. long and 12 mm. broad. Theobald also inclined to this view, but Nevill was of opinion that what he considered *giganteus*, of which he had seen specimens from Nepal, was a larger and distinct species*.

Godwin-Austen, however, subsequently appears to have modified his opinion, for in the copy of his 'Land and Freshwater Mollusca of India,' at the Natural History Museum, is a note in pencil, from his hand, on page 48 as follows:—pl. vi, fig. 1 "Simla. This sp. is not *giganteus*. A sp. of true *giganteus* has been received from Kadmandu."

The Nepal specimens referred to by Nevill as *giganteus*, on the other hand, Godwin-Austen named *insignis* as recorded under *A. jerdoni*.

464. Anadenus giganteus, *Heynemann*.

> *Anadenus giganteus*, Heynemann, Malak. Blätt. x, 1863, p. 140, pl. 1, figs. 1 *a*–1 *f* (dentition), fig. 1 *g* (interior shell), fig. 1 *h* (part of back); Godwin-Austen, Moll. India, i, 1882, p. 48; Tryon, Man. Conch. ser. 2, i, 1885, pl. 59, fig. 63 (shell).
>
> *Anadenus* (*Altivagus*) *giganteus*, Cockerell, The Conchologist, ii, 1893, p. 192.

Original description (in German):—"Length of contracted animal 80 to 100 mm. Length of the mantle 30 to 40 mm.

"Colour isabelline, brownish.

"Internal shell 20 mm. long, 12 mm. wide, flat, very thick.

"Jaw with about fourteen ribs, more or less distinct from each other in front. The terminal ribs are fused.

"Radula: 110 transverse rows. Central tooth slender, long-necked, with a long point and indication of side cusps. Laterals scarcely different, inclining towards the middle, with still longer points and similar indications of side cusps. The less developed teeth towards the margin have much longer points but no side cusps.

"The upright position of the points, especially noticeable in the laterals, is also characteristic of *Arion*.

* Sci. Res. Second Yarkand Mission, Mollusca, 1878, p. 21.

"From the size of the contracted animal, from the circumference of the internal shell, and from the size of the teeth-plates it may be assumed with some amount of certainty that this species is of extraordinary length. *Limax Doriæ*, Bourguignat, to which a length of from 360 to 450 mm. is attributed by its author, has scarcely so large an internal shell in the figure (Rev. Mag. pl. 8,

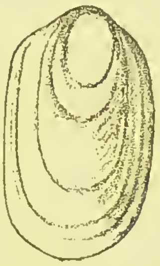

Fig. 150.—*Anadenus giganteus.*
(Shell. Copied from Land and Freshw. Moll. India.)

June 1861), although I do not suppose that this astounding length could be attained by *giganteus*. It may be equally striking in the living state from its bright colour, which doubtless does not differ greatly from that of spirit-specimens." (*Heynemann.*)

Hab. India : Shimpti (Shipki ?), Kumaon ; Badrinath to Massuri, Garhwal (*Schlagintweit*).

Originally Lieut.-Col. Godwin-Austen considered the present species identical with Theobald's *altivagus*, but, as recorded under the latter, he subsequently modified his view and admitted *giganteus* as a distinct form.

465. **Anadenus beebei**, *Cockerell.*

Anadenus beebei, Cockerell, Bull. Amer. Mus. Nat. Hist. xxxii, 1913, p. 617, figs. 1–7 (anatomy).

Original description :—"Color (in alcohol) warm ochreous, the neck suffusedly blackish above; lateral areas of sole dark plumbeous. Mantle irregularly reticulate with deep furrows; body with the usual oblique grooves, the primary ones below and behind the end of the mantle 2–2½ mm. apart; sole, except anteriorly, irregularly reticulated with deep furrows, and with very distinct plumbeous lateral areas, which are narrow and obsolescent anteriorly, gradually widened caudad, but become narrow at the hind end; in the middle of the animal each lateral area is as wide as the middle one.

"Length (in alcohol) 106 mm.; length of mantle 36 mm., its width (flattened out) 27 mm., the respiratory orifice 23 mm. from anterior end; width of sole 17 mm."

Hab. India : Garhwal, N.W. Prov. (*C. W. Beebe*).

"Jaw dark chestnut brown, with eight very strong flattened ribs, but the ends (about $\frac{3}{4}$ mm.) ribless. Lingual teeth normal for the genus in general characters; central teeth long and narrow, with the ectocones poorly developed; lateral teeth without or with only poorly developed accessory denticles. Stomach very large, containing vegetable matter, which includes quite large pieces of leaves. Lung normal. Kidney considerably longer than wide. Shell a membranous plate containing minute calcareous granules, much more numerous and smaller than those of *Arion*. Penis-sac narrow apically, rather abruptly broadening above the middle, the basal part very stout; the inside walls are strongly plicate, and on one side bear very many tapering fleshy filaments.

"By the character of the teeth, and also the oblique lateral grooves of the body (except that in *A. beebei* they are closer together), this resembles *A. giganteus*, Heynemann, but it differs entirely in the shell. The jaw of *A. giganteus* has fourteen ribs, whereas that of *A. beebei* has only eight. The color of the sole is also distinctive.

"*A. beebei* cannot be the species named *A. insignis* by Godwin-Austen, but scarcely described, as that is said to resemble *A. jerdoni*, and to differ in the character of the dorsal and lateral grooves from *A. giganteus*.

"The shell, jaw and teeth readily distinguish our slug from *A. altivagus*. Pilsbry and Godwin-Austen both show the kidney of *A. altivagus* as very broadly oval; in *A. beebei* it is considerably narrower. I do not find calcareous spines in the penis-sac, but instead very numerous tapering fleshy processes. Pilsbry found minute processes in the specimen he dissected, which he referred to *A. altivagus*. The penis-sac in our slug is not at all like that figured by Pilsbry; it is rather similar in type to Godwin-Austen's figure of *A. altivagus*, but differs in the proportion of the parts.

"Comparison with the other Indian species does not indicate any close similarity, and the more recently described *A. dautzenbergi*, Collinge, *A. sechuenensis*, Collinge, and *A. sinensis*, Möllendorff are also evidently distinct." (*Cockerell.*)

466. **Anadenus modestus**, *Theobald.*

Limax modestus, Theobald, J. A. S. B. xxi, 1862, p. 489.
Anadenus modestus, Theobald, Cat. Land and Freshw. Shells Brit. India, 1876, addenda, p. i; Nevill, Sci Res. Second Yarkand Mission, Mollusca, 1878, p. 21; ibid., Hand List, i, 1878, p. 65; Godwin-Austen, Moll. India, i, 1882, p. 53.
Anadenus (*Altivagus*) *modestus*, Cockerell, The Conchologist, ii, 1893, p. 192.

Original description:—"Corpore limaciformi, postea acuminato, colore cinereo, fuscis punctis notato; dorso duobus lineis maculosis cateniformibus ornato, a sese et a margine equidistantibus et a pallio usque ad extremitatem extensis, spatio his lineis incluso

paullo fuscente et elegante fuscis lineis striato et marmorato. Tentaculis quatuor rubro-fuscis.

"Longitudinis $1\frac{1}{2}$ unc. [=38 mm.]." (*Theobald.*)

Hab. India: Cissutlej Hills near Fagu, Narkanda, Saraon, etc.

"It is 'much smaller and rather more elegantly shaped,' and is, perhaps, rather more numerous than *altivagus*, though this is far from uncommon.

"There is a very small species in the British Museum in the same bottle with *A. giganteus*, mentioned above, which appears immature, but is certainly another species. It measures:—Total length 20 mm., mantle 9·0; breadth 5·5. It may be distinguished by its olive-brown colour and having the mantle speckled with black, and two well-marked lines of this colour on either side of the extremity of the foot; it agrees well with *modestus* of Theobald. I hope shortly to receive a collection of slugs from Darjeeling which may contain this species, for there is now some doubt whether *giganteus* of Heynemann was ever obtained there. This may possibly be the young of *A. schlagintweiti*, described by Heynemann on p. 141, *l. c.*; but he does not give any dimensions." (*Godwin-Austen.*)

467. **Anadenus schlagintweiti**, *Heynemann.*

Anadenus schlagintweiti, Heynemann, Malak. Blätt. x, 1863, p. 141, pl. 1, fig. 2 *a–d* (teeth), fig. 2 *e* (shell); Godwin-Austen, Moll. Ind. i, 1882, p. 51, pl. 7, fig. 3 (shell); Tryon, Man. Conch. ser. 2, i, 1885, p. 250, pl. 59, fig. 61 (shell).

Anadenus (? section) *schlagintweiti*, Cockerell, The Conchologist, ii, 1893, p. 192.

Original description (in German):—"Length of contracted animal 45 to 60 mm. Length of mantle 25 mm. Colour ashy-grey to blackish.

"Internal shell 11 mm. long, $7\frac{1}{2}$ mm. broad, moderately thick, flat.

"Jaw with about 16 ribs; the outer coherent, the inner appear somewhat beak-like, in front they are all separate.

"Radula, 125 transverse rows, 90 longitudinal rows.
,, 110 ,, ,, 80 ,, ,,

Fig. 151.—*Anadenus schlagintweiti.*
(Shell. Copied from Land and Freshw. Moll. India.)

"Central tooth broadly triangular with moderately long points.

Side cusps placed on somewhat broader base. Laterals scarcely different from central tooth, inclined towards the middle. The shape does not perceptibly vary towards the margin, only the side cusp ultimately vanishes.

"The young animal: a black spot occurs on the posterior part of the mantle, terminating in a point anteriorly and enclosing a small area lighter in colour than the rest of the mantle. The sides of the mantle are spotted with black. On both sides the body is marked with a broad, black band, sharply defined towards the back but gradually shading off towards the sole. The back itself is again somewhat darker.

"It may be presumed that, as is the case with many European slugs which in their immature state are elegantly coloured in a similar manner, this marking disappears later through darkening of the rest of the pigment.

"Since the entire collection is comprised of these two species [*A. giganteus* and *A. schlagintweiti*] and these were obtained in several localities, the genus may be regarded as widely distributed and common." (*Heynemann.*)

Hab. India: Simla; Simla to Sultanpore; Bias at Bishisht, Kulu; Bias Kund, Rotang Pass (*Schlagintweit*).

Lieut.-Col. Godwin-Austen thinks this species is externally very similar to *A. altivagus*, but smaller. He doubts the Sikkim locality.

468. **Anadenus jerdoni**, *Godwin-Austen.*

Anadenus jerdoni, Godwin-Austen, Moll. India, i, 1882, p. 52, pl. 7, fig. 7 (animal); Tryon, Man. Conch. ser. 2, i, 1885, p. 250, pl. 59, fig. 64 (animal).

Anadenus (*sulcati*) *jerdoni*, Cockerell, The Conchologist, ii, 1893, p. 192.

Original description (from spirit-specimen):—"Animal large. The mantle apparently finely papillate in life. The foot above very coarsely wrinkled, rounded at extremity. No gland. A very narrow pedal margin. The respiratory orifice at the posterior right margin or about one third the length of the mantle from the posterior side. The eye-tentacles would appear to be very large at the base. The mantle viewed from above, is rather circular in form. The foot has a wide central area.

"Total length 101·6, mantle 38·0, breadth 31·8 mm.
" " 4, " 1·5, " 1·25 inch,

"Jaw is well ribbed, and 0·2 inch or 5·1 mm. wide."

Hab. India: Kashmir (*Jerdon*).

"There is only one specimen at the British Museum and therefore I am unable to give any details of the anatomy of this species, of which no doubt some will be found in the Indian Museum Collection, Calcutta. The gigantic specimens alluded to by

Mr. G. Nevill, in the Molluscan portion of the 'Scientific Results of the Second Yarkand Mission,' under *Anad. altivagus*, I well remember his showing me in Calcutta. They are certainly very distinct from the Simla specimens I have seen, and much nearer *A. jerdoni* in outward appearance. Heynemann's name would have well suited these gigantic Nepalese slugs; but his description certainly applies to a much smoother animal, so well shown in his figure of a portion of the foot viewed from above (plate 1, fig. 1*h*), and which I reproduce on plate vii, fig. 4. The Nepalese species I propose to distinguish by the name *insignis*." (*Godwin-Austen.*)

It is rather unfortunate that Lieut.-Colonel Godwin-Austen, when naming this species, did not give a full description.

Fig. 152.—*Anadenus jerdoni*.
(Copied from Land and Freshw. Moll. India.)

469. **Anadenus blanfordi**, *Godwin-Austen.*

Anadenus blanfordi, Godwin-Austen, Moll. India, i, 1882, p. 53; Cockerell, The Conchologist, ii, 1893, p. 192.

Original description:—"From the single spirit-specimen it would appear to have been of a dark ochraceous brown, with some dark grey mottlings on the upper part of the foot. It may be distinguished by the very different arrangement of the warty protuberances on the epidermis, these being well raised, isolated, and elongately diamond-shaped.

"Total length 44, length of mantle 16, breadth 11 mm." (*Godwin-Austen.*)

Hab. India: Darjeeling, about 7000 ft. (*Blanford*).

"There is no doubt of its distinctness from all other species I have seen, but I defer figuring it until I receive a large collection in spirit now on its way from Sikkim." (*Godwin-Austen.*)

Family PHILOMYCIDÆ.

Genus INCILARIA, *Benson*.

Limacella, Blainville, Journ. Phys. Paris, lxxxv, 1817, p. 443 (not *Limacella*, Brard, 1815); Cockerell, The Conchologist, ii, 1893, p. 193.
Incilaria, Benson, A. M. N. H. ser. 1, ix, 1842, p. 486.

TYPE, *I. bilineatus*, Benson.

Range: India, China.

"Body limaciform, entirely naked: foot equalling the body, but separated from it by a groove. Orifices of the generative organs distant, connected by a furrow occupying the entire right side of the body." (*Blainville.*)

Professor Cockerell, in his Check-list of Slugs*, has adopted *Limacella*, Blainville, 1817, for the present genus, in spite of the fact that Brard had already, in 1815, utilized the name. The latter simply being a synonym of *Limax*, Prof. Cockerell considers that the rule "once a synonym always a synonym" should be suspended in this case. As this would give rise to confusion I have felt it necessary to substitute the next name available for these oriental slugs, discarding *Philomycus*, Rafinesque (1820), *Tebennophorus*, Binney (1842), *Pallifera*, Morse (1864), *Meghatinum*, Hasselt (1824), and *Eumelus*, Rafinesque (1820), the first three applying to American forms and the last two as being insufficiently defined.

470. Incilaria campestris, *Godwin-Austen*.

Philomicus (Incillaria) campestris, Godwin-Austen, J. A. S. B. xlv, 1876, p. 315, pl. 8, fig. 3.
Limacella campestris, Cockerell, A. M. N. H. ser. 6, vi, 1890, p. 385; ibid., The Conchologist, ii, 1893, p. 193.

Original description:—"No shell. Animal pale ochre, with a longitudinal dark stripe on the side of the body. Tentacles very short, only 0·13″ [=3·5 mm.].

"Total length 1·65″ [=42 mm.]." (*Godwin-Austen.*)

Hab. India: Kholabari, Dafla Hills, Assam.

This cursory description may be supplemented by the following observations by Prof. Cockerell, who regarded the form as a subspecies of *Limacella bilineata*:—"Ochraceous yellow, with an obscure dorsal and lateral pale brown band, narrow and more or less interrupted. Sole finely laterally transversely wrinkled. Length 23 millim., respiratory orifice 4 millim. from anterior border of mantle; sole 4 millim. broad.

* The Conchologist, ii, 1893, pp. 193, 215.

"Shape of slug cylindrical, tapering posteriorly. Jaw pale, ribbed. Differs from *confusa* in its non-tuberculose sole and different markings and its ribbed jaw. Described from five specimens in the British Museum from Dukhun.

"Although Godwin-Austen gives but a short description and rather indifferent figure of his type of *campestris* from Kholabari, and says nothing about the jaw, I think there can be no necessity for considering our Dukhun form distinct from *campestris*, since, so far as we know, there is not any important difference between them. Should the type of *campestris* be found later on not to have a ribbed jaw, it will be time to propose a new subspecific name for the slugs described above. The discovery of a group of *Limacella* with ribbed jaw in Asia is very interesting and tends to endorse the opinion that this is not a generic character."

471. **Incilaria monticola**, *Godwin-Austen.*

Philomicus monticolus, Godwin-Austen, J. A. S. B. xlv, 1876, p. 315.
Limacella monticola, Cockerell, The Conchologist, ii, 1893, p. 193.

Original description:—"Animal white, tinged with pale lilac, having intensely black spots scattered over body, with one longitudinal band of same colour along the side, and one central down middle of back; foot white below; tentacles very short, brown, the two lower ones wide apart and very short indeed. Extremity of foot pointed."

"Total length 1 inch" [=25·5 mm.]. (*Godwin-Austen.*)

Hab. India: Hills bordering Kopili River, North Cachar Hills.

Family VAGINULIDÆ.

Genus **VAGINULUS**, *Férussac.*

Vaginulus, Férussac, Tabl. Syst. Fam. Limaces, 1821, pp. 9, 13; ibid., Hist. Nat. Moll. ii, part 1, 1823, pp. 96m, 96p.
Vaginula (em.), Humbert, Mém. Soc. Phys. Hist. Nat. Genève, xvii, 1864, p. 123; Fischer, Nouv. Arch. Mus. Hist. Nat. Paris, vii, 1871, p. 156; ibid., Man. Conchyl. 1883, p. 493 (in part); Sarasin, Land-Moll. Celebes, 1899, p. 72 (anatomy and embryology); Pelseneer, Mém. Acad. Roy. Belg. liv, fasc. 3, 1901, p. 23, pl. 6, figs. 49–55 (anatomy).

TYPE, (first species) *V. taunaisi*, Férussac.

Range. India, Burma, Ceylon, Malay Archipelago, South America.

Body more or less elongated, oblong in the contracted state,

narrow and linear when extended, acuminate posteriorly, sometimes rounded.

Mantle covering the whole of the upper part of the body, separated from the sides by a lateral margin, smooth and united in the extended state, without internal shell or calcareous particles.

Foot consisting of numerous, crowded, narrow, well-marked rings; separated from the sides by a deep furrow and projecting on either side, covering the furrow with a thin edge, sometimes projecting beyond the mantle posteriorly, where it is flat, acuminate or rounded, free and distinct from the side.

Head distinct, consisting of a buccal mass, provided with an internal jaw and terminal papillæ, disposed in a circle as in Limaces, consequently without lips or buccal tentacles: it can be withdrawn under the mantle, which, together with the sides and the anterior portion of the foot, forms a kind of case for its reception.

Tentacles four, unequal, contractile; the upper pair long, cylindrical, blunt, bearing the eyes at the apex, the lower pair short, slightly lateral, and subpalmate or subdigitate at the extremity.

Pulmonary cavity situate anteriorly on the right side at about two-fifths of the total length, communicating with the outer air by a lateral duct which opens out at the posterior part of the body, between the mantle and the free portion of the foot, in a kind of pocket, where the anal duct, placed below the respiratory duct and separated from it by a membrane, also has its outlet.

Generative organs distinct and separate.

Orifice of male organ near and below the lower right tentacle.

Female orifice below the mantle on the right side, near the foot, towards the middle of the body.

No terminal mucous pore.

472. **Vaginulus alte**, *Férussac.*

Vaginulus alte, Férussac, Tabl. Syst. Fam. Limaces, 1821, p. 14; ibid., Hist. Nat. Moll. ii, part 1, 1823, p. 96 x, pl. 8 A, fig. 8, pl. 8 B, fig. 6.

Vaginula alte, Fischer, Nouv. Arch. Mus. Hist. Nat. vii, 1871, p. 157.

Veronicella alte, Cockerell, The Conchologist, ii, 1893, p. 193.

Original description:—"La forme générale de cette espèce se rapproche tellement de celle de l'onchidie du Typha de Buchanan, que nous crûmes au premier coup d'œil que c'étoit elle: vivant dans les mêmes contrées, cette circonstance rendoit notre supposition assez probable; mais l'examen que nous en avons fait, en nous montrant quatre tentacules et une organisation extérieure semblable à celle des espèces précédentes, nous tira de notre erreur. Il faudroit supposer, chez le docteur Buchanan, une méprise singulière, qui ne peut se présumer, malgré toute l'analogie extérieure de ces deux limaces. Selon Mr. Leschenault, la vaginule alté est ainsi nommée, parce qu'elle ressemble à une

sangsue dont le nom du pays est Alté. L'étiquette du Muséum l'indique comme étant des eaux douces, ce qui nous paroit mériter confirmation." (*Férussac.*)

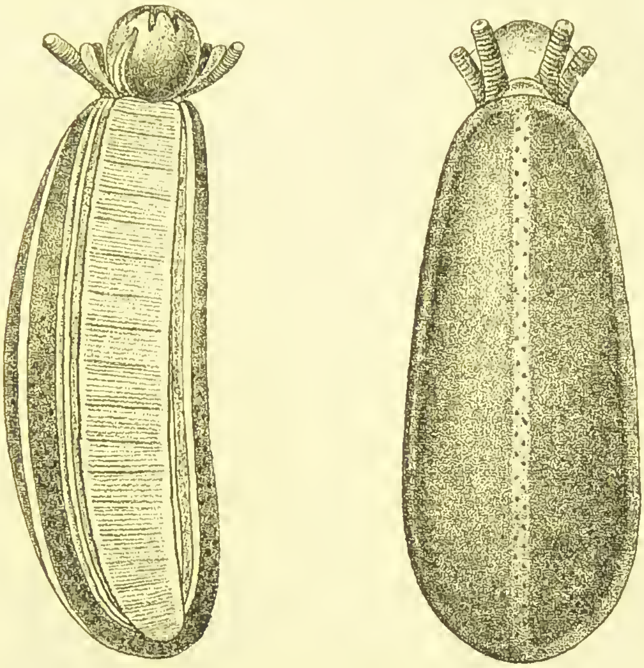

Fig. 153.—*Vaginulus alte.*
(Copied from Férussac, Hist. Nat. Moll.)

Length 52 mm., breadth 19·5 mm. (*ex icon.*).
Hab. India: Poudicherri (*Leschenault*).

473. **Vaginulus frauenfeldi**, *Semper.*

Vaginula frauenfeldi, Semper, Reisen Arch. Philipp. 2te Teil, iii, 1885, p. 324, pl. 27, fig. 32.
Veronicella frauenfeldi, Cockerell, The Conchologist, ii, 1893, pp. 193, 215.

Original description (in German):—"Roundly truncated anteriorly and posteriorly; skin rather smooth, the tubercles very small and crowded, each provided at the apex with a pit which, in large specimens especially, is of considerable size. The dorsal surface is greyish-brown with black spots, with a median yellow line which at neither end reaches quite to the mantle. Lower surface light yellowish-brown, upper tentacles bluish-black.

"Length 24 mm., breadth 10·5 mm. Sole 4 mm. wide.
" 43 mm., " 16 mm. " 6 mm. wide."

Hab. India: Madras (*Vienna Museum*). (*Semper.*)

The folds of the foot-sole are at the rate of 40 to 10 mm.

In the smaller specimen the female genital orifice is 10 mm. distant from the posterior extremity, in the larger one 19 mm., in both it is very near the edge of the foot.

474. **Vaginulus templetoni**, *Humbert.*

Vaginula ——?, Templeton, A. M. N. H. ser. 3, i, 1858, pl. 2 B, fig. 6.

Vaginula templetoni, Humbert, Mém. Soc. Phys. Hist. Nat. Genève, xvii, 1864, p. 126, figs. 3–3 K; Fischer, Nouv. Arch. Mus. Hist. Nat. Paris, vii, 1871, p. 157; Semper, Reisen Arch. Philipp. 2te Teil, iii, 1885, p. 324, pl. 27, fig. 32 (anatomy); Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 268; Collett, J. A. S. Ceylon Branch, xvi, 1900, p. 138.

Veronicella templetoni, Theobald, Cat. Land and Freshw. Shells Brit. India, 1876, p. 33.

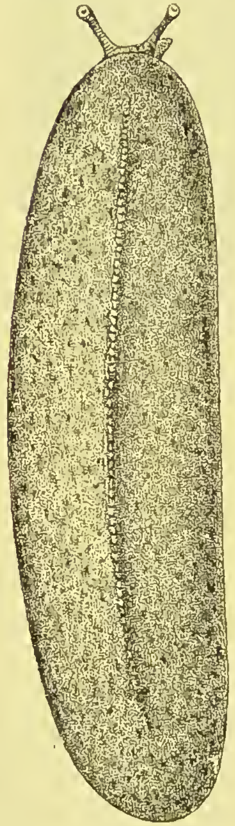

Fig. 154.—*Vaginulus templetoni.* (Copied from Mém. Soc. Phys. Hist. Nat. Genève.)

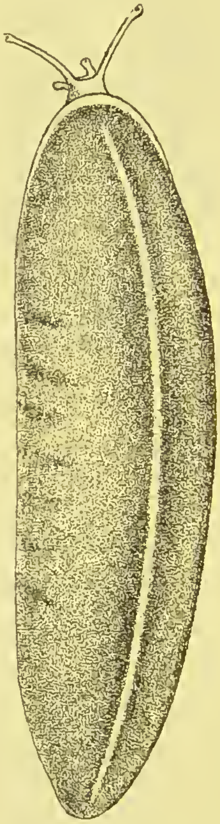

Fig. 155.—*Vaginulus templetoni.* (Copied from A. M. N. H.)

Original description:—Arrondie en dessus, sans carène dorsale bien marquée; une ligne tuberculeuse médiane de couleur claire

s'étendant sur les deux tiers environs de la longueur du manteau (dans l'état de contraction). Parties supérieures d'un brun chocolat, très finement granuleuses. Des tubercules un peu plus gros, arrondis, noirs, semés assez régulièrement sur toutes les parties supérieures du manteau; d'autres de même forme et à peu près de même grosseur, mais blancs, sur les régions latérales. Parties inférieures du manteau et du pied d'un jaunâtre uniforme. Dessous du manteau très-finement granuleux.

"Pédoncles oculaires d'un chocolat clair; tentacules de la même couleur avec leur appendice inférieure blanchâtre." (*Humbert.*)

Length 65 mm., breadth 16 mm. (animal extended).

Hab. Ceylon: Peradenia (*Humbert, Simon*); Ratnapoora (*Templeton*).

In contracting the body becomes shorter, broader, and higher, until it assumes an almost spherical shape. Humbert was of opinion that this species is the same as the form from Ratnapoora, figured, but neither named nor described, by Templeton.

It is stated to differ from *V. maculatus* by the following characters:—

1. The colour of the tentacles of the upper parts and especially of the under surface of the mantle.
2. The absence of a distinct dorsal keel.
3. The dimensions of the granules of the mantle, the largest of which are almost invisible to the naked eye.
4. The less attenuated margins of the mantle and by the body less flattening itself against the ground.
5. The genital orifice a little nearer to the foot (?).

475. **Vaginulus maculatus**, *Templeton.*

Vaginula maculata, Templeton, A. M. N. H. ser. 3, i, 1858, p. 49, pl. 2 B, fig. 1; Humbert, Mém. Soc. Phys. Hist. Nat. Genève, xvii, 1864, p. 123; Fischer, Nouv. Arch. Mus. Hist. Nat. Paris, vii, 1871, p. 156; Semper, Reisen Arch. Philipp. 2te Teil, iii, 1885, p. 322, pl. 27, fig. 30 (anatomy); Jousseaume, Mém. Soc. Zool. France, vii, 1894, p. 268.

Vaginulus maculatus, Nevill, Hand List, i, 1878, p. 198.

Veronicella maculata, Theobald, Cat. Land and Freshw. Shells Brit. India, 1876, p. 33; Cockerell, The Conchologist, ii, 1893, p. 193.

Original description:—"Body ovate-oblong, depressed, rounded behind; the dorsum dark or brownish-grey, densely studded with minute papillæ; speckled with black, angular or irregular maculæ; a yellow mesial line down the back; margins edged with a yellowish or pale band; superior pair of horns hyaline, the buccal pair yellowish-grey.

"The body never makes any approach to linear, even when most extended; it is always rather broad, and fully rounded posteriorly, less so at the anterior extremity. There is no

defined margin separating the central part from the edges; the latter are merely a little flatter; there is not the least trace of solid material in the covering or in the substance of the body. The superior pair of horns are cylindrical, somewhat longish, and terminate in a little rounded bulb, on the upper surface of which the minute black eye is imbedded; the buccal pair is bilobed, but not deeply sulcated, appearing exactly as if two short cylinders were under a skin. The foot terminates a little before the end of the mantle; it occupies in breadth about one-fifth or rather

Fig. 156.—*Vaginulus maculatus.* (Copied from A. M. N. H.)

Fig. 157.—*Vaginulus maculatus.* (After Templeton.)

more of the under surface, and is separated by a deep groove from the mantle, so that it appears as if winged; it has about 200 transverse rugæ in the inch, which, in the advancing movement of the animal, present precisely the same appearance as the legs of *Julus*, a wave running from behind forward, about six rugæ forming each wave, with an interval of fourteen to eighteen between them. The under surface of the body of the animal on each side of the foot is covered with minute papillæ or tubercles, about 180 in an inch.

"The habits of the animal, as far as I had an opportunity of

examining them, appear to differ in no respect from those of *Limax*." (*Templeton.*)

Length 51 mm. (*ex icon.*).

Hab. Ceylon: Colombo (*Templeton*); Point de Galle (*Semper*); Peradenia, Ballacadua Pass (*Humbert*).

The specimen recorded by Humbert was stated to measure: at rest 35 mm. long, 18 mm. broad; in motion 60 mm. long, 17 mm. broad.

476. **Vaginulus reticulatus**, *Westerlund.*

Vaginulus reticulatus, Westerlund, Nachr. Deuts. Malak. Ges. 1883, p. 49; ibid., Vega Exped. Vetensk. Jaktag. iv, 1885, p. 192.
Veronicella reticulata, Cockerell, The Conchologist, ii, 1893, p. 193.

Original description:—"Pallium densissime punctatum, rugosum et granulis parvis confertis obsitum, non carinatum, olivaceum, nigro-maculatum, striga mediana aurantia distincta notatum; infra pallidum, concolor; pes flavidus." (*Westerlund.*)

Length of mantle (spirit-specimen) 50, breadth 23 mm. Breadth of foot 6 mm.

Hab. Ceylon: Point de Galle.

Probably allied to, if not identical with, *V. maculatus*. No figure has been published and I have not seen specimens.

477. **Vaginulus sarasinorum**, *Simroth.*

Vaginula, n. sp. (No. 3), Simroth, Sitz. Ber. Naturf. Ges. Leipzig, 17 & 18 Jahrg. 1892, p. 66.
Vaginula sarasinorum, Simroth, tom. cit. p. 85.
Veronicella sarasinorum, Cockerell, The Conchologist, ii, 1893, p. 193.

Original description (in German):—"Likewise a Pleurocaulier with the highest degree of development of the penis (in consequence of protracted isolation in mountains?). This organ has the aspect of the head and neck of a cock with a very large comb, the orifice being in the bill; the comb, ringed with deep polygonal honey-combs, forms the glans. Dart glands, intestines, salivary glands, etc., similar. Papillæ of the dart glands simple, shortly conical. Tentacles more or less prominent." (*Simroth.*)

It is unfortunate that no description or figure of the animal of this species has been published.

478. **Vaginulus birmanicus**, *Theobald.*

Vaginulus birmanicus, Theobald, J. A. S. B. xxxiii, 1864, p. 243; Nevill, J. A. S. B. xlvi, 1877, part 2, p. 23; ibid., Zool. Res. Two Exp. West. Yunnan, i, 1878, p. 883; Blanford in Nevill, Hand List, i, 1878, p. 199.
Veronicella birmanica, Stoliczka, J. A. S. B. xlii, part 2, 1873,

p. 34; Cockerell, The Conchologist, ii, 1893, p. 193; Collinge, Journ. Malac. iii, 1894, p. 1.
Veronicella barmanorum, Theobald, Cat. Land and Freshw. Shells Brit. India, 1876, p. 33.
Vaginula birmanica, Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 337.

Original description:—"Corpore elongato, lævi, ante et pone eleganter rotundato, colore fusco, minutissime flavo maculato, subter albescente. Pede transversim rugoso, totius corporis longitudinis, sex vix ad quartam partem latitudinis attingente. Tentaculis quatuor; binis superioribus fuscis, oculiferis; inferioribus minus elongatis quamquam robustis, et papillam retractilem, sensu acutissimo præditam, subter gerentibus.

"Long. 50 mill." (*Theobald.*)

Hab. Burma: Rangoon, Pegu, Thyet Myo, etc. (*Theobald*); Bhamo (*Nevill*, *Fea*). India: Calcutta, Moisraka (*Stoliczka*, *Nevill*). Penang (*Stoliczka*).

"This slug is pretty common at Rangoon and is found harbouring under potsherds, bricks, and rubbish in moist spots." (*Theobald.*)

Mr. Collinge having obtained some spirit-specimens, found the description of the foot sole very inadequate and redescribed it as follows:—

"The specimens average from 28 to 38 mm. in length and 10 to 18 mm. in breadth. The ground-colour is yellowish brown, minutely marked with a series of black dashes and spots, these being absent in the median line of the dorsum, on which runs a pale yellow line. Nevill states that the sole of the foot is nearly white, with faint, transverse, white lines; now in the specimen I have, the foot is very similar to the ground-colour of the dorsal surface and it is certainly not white or even pale yellow. The foot sole may be divided into seven distinct parts. On either side is a plain lateral plane, finely and regularly marked, next a distinct line separating the lateral plane from, what I shall term, the inner plane, which is divided in a regular manner by a series of transverse lines or grooves at intervals of about ½ millim. The two inner planes stand out more prominently than any other portion of the foot, so that the median plane is somewhat concave, but possibly this is only due to the effect of the alcohol. The median plane is also marked by a series of fine transverse lines.

"In the largest specimen, measuring 38 mm. in length and 18 mm. in breadth, the lateral planes are 1 mm. broad, the inner plane ½ mm., and the median plane 1 mm.

"The median plane is really the outer wall of the pedal gland, and passes from just beneath the mouth to the posterior end of the body, gradually becoming narrower and terminating about 2 mm. from the extreme edge of the foot sole."

479. **Vaginulus proximus**, *Tapparone Canefri.*

Vaginula proxima, Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 338, pl. 7, figs. 8, 9 (animal).
Veronicella proxima, Cockerell, The Conchologist, ii, 1893, p. 193.

Original description:—"V. corpore convexiusculo, anguste oblongo, antice posticeque attenuato. Pallium superne minutissime et creberrime granulato-rugosiusculum, fusculum, linea pallida postice evidentiore in medio notatum et utrinque usque ad marginem maculis parvis lineolisque nigrescentibus reticulatum; infra pallidum, unicolor. Pes pallidus, valde angustus, tertiam totus latitudinis partem non aequans, antice subdilatatus, postice in maculam fusco-plumbeam desinens, undique lineis tenuibus, crebris, regularibus transverse exaratus. Orificium genitale femmineum, infra, in parte pallii dextera, 2 mill. a pede, parum infra medium totius longitudinis erumpens." (*Tapparone Canefri.*)

Length 40 mill.; breadth 12 mill.

Hab. Burma: Bhamo (*Fea*).

This species is stated to have great affinity with *V. birmanica*, Theobald, but to differ in the following characters:—(1) It is

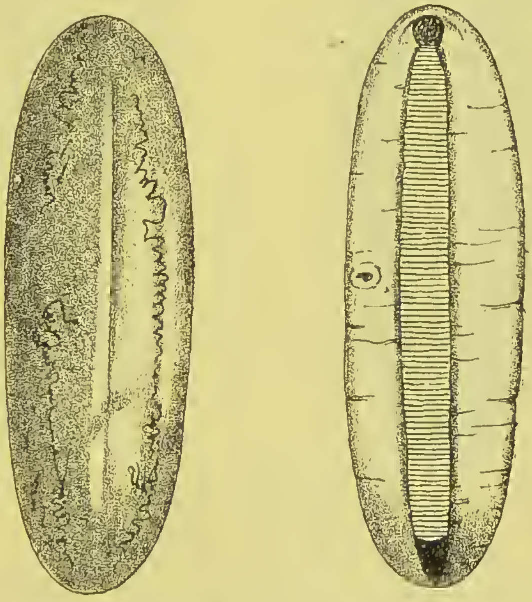

Fig. 158.—*Vaginulus proximus.* $\frac{3}{2}$.
(Copied from Ann. Mus. Civ. Genova.)

more contracted in proportion to its breadth; (2) it is less depressed and generally darker in colour; (3) the female genital

orifice is situate below the middle of the total length of the body, whereas in its ally this is exactly in the middle ; (4) the foot terminates posteriorly in a blackish point, while numerous specimens of the allied form have the foot entirely of one colour.

480. **Vaginulus andersonianus**, *Tapparone Canefri.*

Vaginula andersoniana, Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 338, pl. 7, figs. 6, 7.
Veronicella andersoniana, Cockerell, The Conchologist, ii, 1893, p. 193.

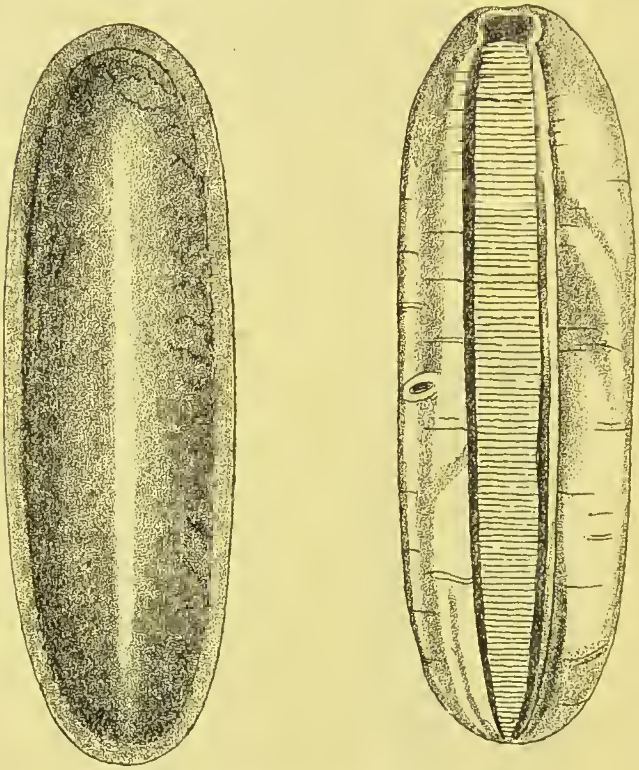

Fig. 159.—*Vaginulus andersonianus.* $\frac{3}{2}$.
(Copied from Ann. Mus. Civ. Genova.)

Original description :—" V. corpore convexiusculo, oblongo, antice posticeque vix attenuato, marginibus lateralibus fere parallelis. Pallium superne minutissime et creberrime granulato-corrugatum, maculis confluentibus parvis parum distinctis, subnigrescentibus, in seriebus duabus lateralibus ad margines propinquioribus dispositis depictum, linea in medio marginibusque pallidioribus ; inferne pallidum, unicolor. Pes pallidus, valde

angustus, transversim regulariter et crebre tenuistriatum. Orificium genitale inferius in parte pallii dextera versus medium 4 mill. a pede erumpens." (*Tapparone Canefri*).

Length 59, breadth 18 mill.

Hab. Burma: Thigyan, Upper Irawaddy (*Fea*).

This species is considerably larger than *V. proximus* and somewhat broader in proportion to its length. The body has almost the shape of an elongated rectangle, the lateral margins of the mantle being nearly parallel, while the anterior and posterior margins are scarcely attenuated and almost truncate. The mantle, in the upper part, is densely covered with minute granules and rugæ, and marked with small confluent blackish spots, disposed in two lateral series, nearer to the margin than to the median line, which at the middle of the margin is paler. The lower part of the mantle and the foot are pale without a trace of spots. The foot is rather narrow and furnished, as in the other species, with numerous thin transverse striæ. The female genital orifice is placed at the middle of inferior right side of the mantle at a distance of about 4 mm. from the foot.

481. **Vaginulus giganteus**, *Godwin-Austen*.

Vaginulus giganteus, Godwin-Austen, P. Z. S. 1895, pp. 443, 451.

Original description:—"Animal elongate in form; female orifice 28·5 mm. from the extremity of the foot, 6 from the middle line of the foot, 1·5 from the pedal groove. The colour in the spirit-specimen is above grey, with dark mottlings, paler near the head, and a narrow pale line down the centre of the back; below dull ochre. Upper surface smooth to the eye, under the lens closely pitted. The sole of the foot narrow, slightly wider than the adjacent under surface. The foot is crossed by rather close, very regular folds, which form distinct grooves across it, very thin, even in width; there are twenty-two such folds in 10 mm. of length, and each transverse fold is divided by a very fine secondary groove. The tentacles, although contracted, are large.

"Total length 68 mm.; total breadth 23; breadth of foot 9."

Hab. Andaman Islands: Port Blair (*Harold Godwin-Austen*).

"This is a remarkably large species, 13 mm. larger than anything described by Semper from the Indian region; the largest mentioned and figured by him is *V. voigtii*, described from a specimen in the Copenhagen Museum. Locality unknown. It differs from Semper's drawing of this species in being narrower as compared with its length, and in the sole of the foot Semper's drawing is life-size and could not fail to show the transverse ridges." (*Godwin-Austen.*)

Genus LEONARDIA, *Tapparone Canefri.*

Leonardia, Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, viii, 1889, p. 331.

Type, *L. nevilliana*, Tapparone Canefri.

Range. Burma.

Animal resembling that of *Vaginulus.* Body elliptical, depressed; head retractile, lower tentacles scarcely bilobed; mantle carinated at the side, which posteriorly on the lower surface and near the anal orifice exhibits an aperture, which is probably the female genital orifice, differing in this respect from the species of the allied genus *Vaginulus.*

This genus, while in fact very nearly allied to *Vaginulus*, nevertheless presents important anatomical differences. The author relates an interesting fact communicated to him by Signor Fea, who collected two specimens. Upon being irritated the animal stretched itself, becoming contorted, and ejected a reddish mucilaginous liquid covering the dorsal surface.

482. Leonardia nevilliana, *Tapparone Canefri*

? *Veronicella*, n. sp., Nevill, J. A. S. B. xlvi, 1877, p. 23.
Leonardia nevilliana, Tapparone Canefri, Ann. Mus. Civ. Genova, ser. 2, vii, 1889, p. 332, pl. 8, figs. 1–3 (animal), pl. 7, figs. 1–5 (anatomy); Cockerell, The Conchologist, ii, 1893, p. 195.

Original description:—"L. corpore elliptico-elongato, antice subtruncato, postice subrotundato. Caput infra subalbidum, superne nigrescens, tentaculis pallidioribus. Pallium fusculum, inferne pallidior, superne colore ad marginem precipue intensiore et undique patina cinerea indutum; obsolete rugosiusculum, papillis minutis rubicundis irregulariter sparsis ornatum, in medio lineam longitudinalem impressam gerens. Pes ochraceo-luteus, linea impressa fuscula per longitudinem divisus et undique lineis incisis minutis frequentissimis transversis exaratus." (*Tapparone Canefri.*)

Long. 98, lat. 40 mm. (Larger spirit-specimen.)

Long. 90, lat. 31 mm. (Smaller spirit-specimen.)

Hab. Burma: Catcin-Cauri Hill, East of Bhamo (*Fea*); ? China: Ponsee, Yunnan (*Anderson*).

The body of this large mollusc is of an elongated elliptical form, somewhat truncate anteriorly and regularly curved posteriorly. The head, whitish below, becomes more or less blackish above, but the tentacles are invariably somewhat paler and occasionally may be slightly reddish.

The mantle is distinguished from the foot by a yellowish-brown tint and is variously variegated in living specimens, paler at the inferior lateral portion, becoming darker above, especially near the margin. A slightly impressed line runs along the middle of the

body. The foot, yellow in living examples, pale yellowish in spirit-specimens, is marked with a brown impressed line in the middle and exhibits numerous impressed transverse equidistant lines.

The accompanying figures have been copied from Tapparone Canefri's plates, fig. 161 having been prepared from originals drawn on the spot from living specimens by Signor Leonardo Fea.

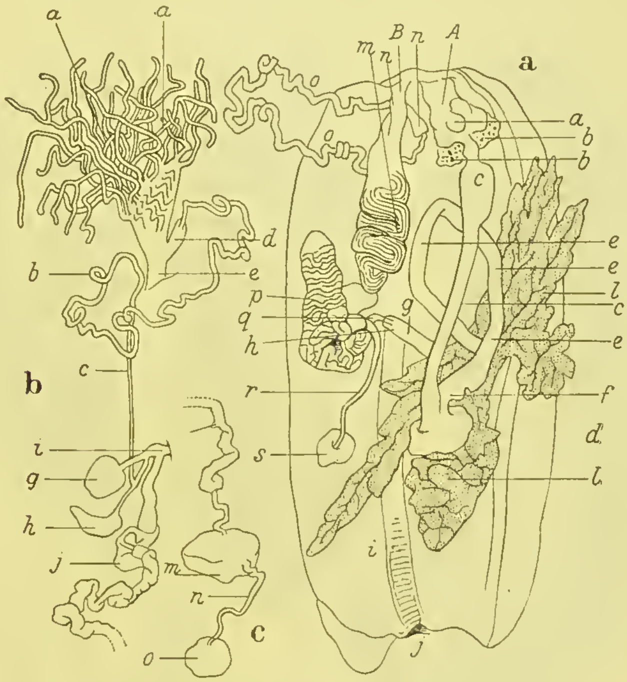

Fig. 160.—*Leonardia nevilliana.*
(Copied from Ann. Mus. Civ. Genova.)

The species is surmised by Tapparone Canefri to have been collected by Anderson, for, from Nevill's remarks, he inferred that the species alluded to by the latter as a *Veronicella* from Ponsee was identical. A spirit-specimen measured 93 mm. in length.

Reproductive System.—As in all the members of this family there are two distinct apertures, one from which the male organ is extruded and the other the female genital orifice. The former, as usual, is situated directly under the inferior tentacle; the exact place where the latter opens out has not been ascertained, but it appeared to communicate with a small cavity situated near the spot where the mantle comes in contact with the foot, exactly above the anal orifice. The duct leading from the orifice to the

base of the ovary likewise has not been ascertained, but no doubt is left that the female genital orifice does not occur on the lower surface of the mantle, as is the case without exception in all *Vaginuli*, an anatomical feature of sufficient importance to warrant generic separation.

The male organ is near the head (fig. 160ª *B*, *m*, *n*, *o*) and, with the external aperture, placed directly behind the lower tentacle; it consists here of a penis (fig. 160ª *B*, *n*), very small as compared with

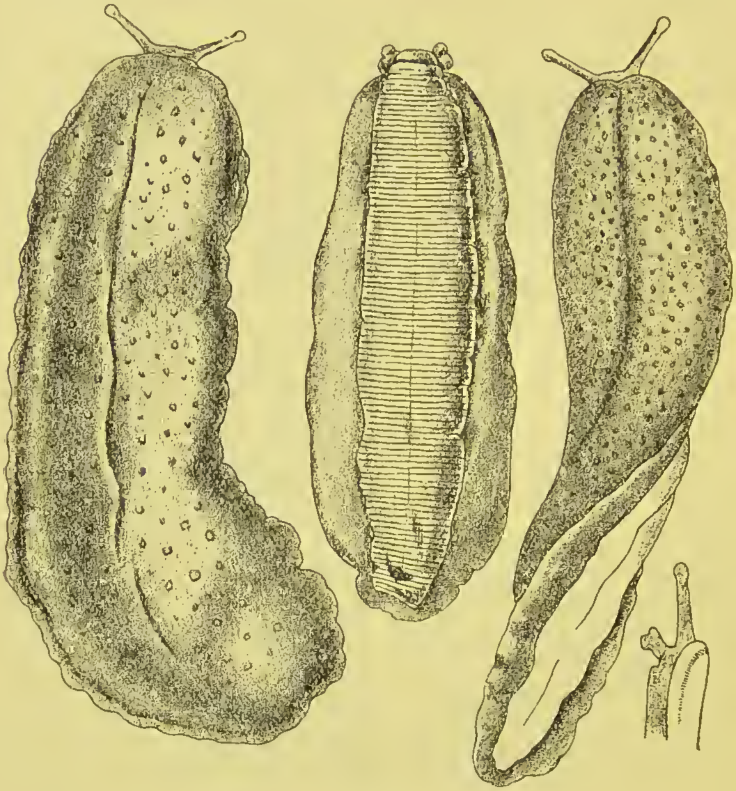

Fig. 161.—*Leonardia nevilliana.*
(Copied from Ann. Mus. Civ. Genova.)

the size of the animal—perhaps dependent upon seasonal change—and a curious and relatively enormous multifid gland (fig. 160ª *B*, *m*) communicating with it. This gland has also been observed in many species of *Vaginulus* but in the present case it attains an exceptional development. It consists of a vestibule 7 mm. long, with a diameter of about 2·5 mm. which gradually increases and from which from 60 to 70 cæca branch off like the roots of a tree-trunk (fig. 160ᵇ *a*) of a pearly white, long, filiform (about ½ mm. in diameter), densely ramified, folded upon themselves at various intervals and gathered into a bundle by a pellucid membrane.

This gives rise in this manner to a large body, cylindrical in the middle and attenuated at the two extremities.

The vas deferens enters the posterior part of the penis, and is of a deep red (fig. 160ᵃ *A*, *o*, fig. 160ᵇ *b*), relatively large and rather long, and as usual twisted and contorted in various ways. At the opposite extremity the vas deferens enters the interior of the integument near the multifid gland described above. Here the integument, reduced to a very slender tube (fig. 160ᵇ *c*) with a diameter of little more than half a millimetre, buries itself for a considerable length and descends about as far as the middle of the body; afterwards, upon emerging again, it terminates in the excretory tube of a small reniform gland (fig. 160ᵇ *h*) which enters the duct of another cistiform body which is fixed in the neck of the ovary, and which may be regarded as a female seminal vesicle. The ovary equals in length twice that of the body, but is much more slender; this may be owing to the animal examined not having probably attained full development (fig. 160ᵃ *B*, *p*, *q*, fig. 160ᵇ *j*).

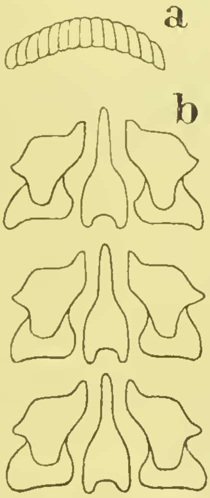

Fig. 162.—*Leonardia nevilliana.*
(Copied from Ann. Mus. Civ. Genova.)

This long ovary in its natural state, moreover, is folded upon itself and apparently twisted in such a manner as to form a single large body, to which are united the forementioned gland and the albuminous glaud (fig. 160ᵃ *B*, *p*), only the hermaphrodite gland, supplied with a long duct, remaining free and directly resting against the liver.

The fact of the vas deferens being concealed for some distance in this integument finds its counterpart in Limnæidæ and in Oncidiidæ; the genus *Leonardia* must, in my opinion, be placed

near the latter, *i. e.* between *Oncidium* and *Vaginula*, having the greatest resemblance and affinity with the latter especially in the general form and several characters. (*Tapparone Canefri.*)

Family JANELLIDÆ.

Subfamily HYALIMACINÆ.

Genus **HYALIMAX**, *H. & A. Adams.*

Hyalimax, H. & A. Adams, Genera Rec. Moll. ii, 1855, p. 219 (as sub-genus of *Limax*); Fischer, Journ. Conchyl. xv, 1867, p. 218, pl. 10, figs. 5-9 (anatomy); Godwin-Austen, Moll. India, i, 1882, p. 55.

TYPE, *Limax perlucidus*, Quoy & Gaimard.

Range. Burma, Andaman and Nicobar Islands, Mascarene Islands.

Orifice of respiratory aperture in the middle of the right side of the mantle; animal pellucid. (*Adams.*)

The genus was exhaustively dealt with by Fischer when describing a new form from Bourbon—*H. maillardi*. The anatomy being figured in detail at the same time, his account fully supplements the cursory description by the brothers Adams.

"L'animal est long d'environ 15 millimètres; le manteau est formé complètement sur le dos et ne laisse apercevoir aucun rudiment de test; ses bords forment cuirasse en avant et en arrière de la masse viscérale. L'orifice pulmonaire est situé à la partie moyenne du rebord du manteau (côté droit); le pied, assez large, se termine en arrière par une pointe, sans pore muqueux. L'orifice génital est placé à droite, à égale distance du grand tentacule et du bord du manteau; en dessous, la tête est séparée du reste du corps par un sillon bien marqué.

"En enlevant les téguments du dos on découvre une limacelle à peu près arrondie, très-mince, un peu bombée à sa face supérieure, et qui me paraît manquer de rudiment spiral; mais peut-être le trouverait-on sur des individus frais.

"La mâchoire est visible à l'extérieur par son bord inférieur; elle est très-remarquable et se compose d'un fer à cheval brun, épais, largement ouvert, très-finement strié vers les extrémités, à bord tranchant simple, non festonné, muni d'une dent obtuse à sa partie moyenne. Au-dessus du fer à cheval existe une lame ou support subquadrangulaire, allongé, étroit, analogue à celui des *Succinea* et des genres voisins.

"La plaque linguale est construite d'après le type ordinaire des Pulmonés herbivores; la denticulation médiane est étroite et son bord inférieur est tricuspide, mais les pointes descendent très-peu;

les denticulations latérales, plus larges, portent en dedans une pointe assez longue et deux ou trois petites saillies externes; les dents marginales ne consistent plus qu'en séries, presque linéaires, de denticulations égales entre elles et extrêmement, petites. Les dents linguales sont disposées sur des lignes plus obliques que dans le genre *Xanthonyx*.

"Les organes génitaux offrent très peu de complication: la verge est longue, simple, enroulée sur elle-même; vers son extrémité, on trouve un muscle rétracteur. Le canal déférent la suit dans toute sa longueur et s'accole à une matrice très contournée et festonnée, sans renflement spécial près de l'orifice commun génital. La glande albuminipare est globuleuse, divisée en lobes très-nombreux; le canal excréteur de la glande en grappe est très tortueux au point où il s'accole à la glande albuminipare.

"La poche copulatrice, placée à l'extrémité d'un col très-long et simple, est petite, arrondie; un muscle rétracteur s'insère sur ses parois.

"Le *mollusque* du Bourbon est donc un *Limacien* par sa coquille complètement interne, mais sa mâchoire le rapproche des *Succinea*; le peu de complication des organes génitaux établit un rapport de plus entre ceux-ci et le genre *Hyalimax*.

"Il existe, par conséquent, parmi les mollusques du groupe des *Succinea*, une série très-complète analogue à celle des *Arionidæ* ou des *Limacidæ*, et dont les principaux termes sont:—

"1° Coquille contenant entièrement le *Mollusque*: *Succinea*, *Simpulopsis*;

"2° Coquille ne recouvrant qu'une portion de l'animal; *Omalonyx*.

"3° Coquille cachée complètement par le manteau: *Hyalimax*;

"4° Coquille absente ou tout-à fait rudimentaire: *Janellia*, *Aneitea*, etc.

"La forme de la mâchoire des *Hyalimax* les distingue de ces divers genres; c'est une combinaison des caractères de celle des *Zonites* (pour le bord) et des *Succinea* (pour le support); le genre *Hyalimax* est donc établi très légitimement; mais nous sommes certain que MM. Adams ne pensaient pas, en le créant, qu'il viendrait un jour se ranger auprès des *Succinea*."

Subgenus **JARAVA**, *Godwin-Austen*.

Jarava, Godwin-Austen, Moll. India, i, 1882, p. 59; Cockerell, The Conchologist, ii, 1893, p. 195.

Respiratory orifice just behind the centre of right side of mantle, a short distance above its lower edge. Anal orifice some distance (3 mm.) behind it, and concealed by the mantle, on the right posterior margin.

Jaw without indication of a central projection.

Dental formula: 265 . 1 . 265.

Shell ovate, thin, flat, apex solid and quadrate (*Godwin-Austen*).

483. Hyalimax andamanica, *Godwin-Austen.*

Hyalimax (Jarava) andamanica, Godwin-Austen, Moll. India, i, 1882, p. 57, pl. 11, figs. 1–4; Cockerell, A. M. N. H. ser. 6, vi, 1890, p. 389; ibid., The Conchologist, ii, 1893, p. 195.

Original description:—"The animal is thus described by my brother, Mr. Harold Godwin-Austen, who sent me four specimens. Pale watery green, yellower on the mantle, with alternate stripes of torquoise-blue and chocolate on the upper part of the neck. These darker lines I suspect are the retractor muscles of the eye-tentacles; the animal when living would appear to have a much

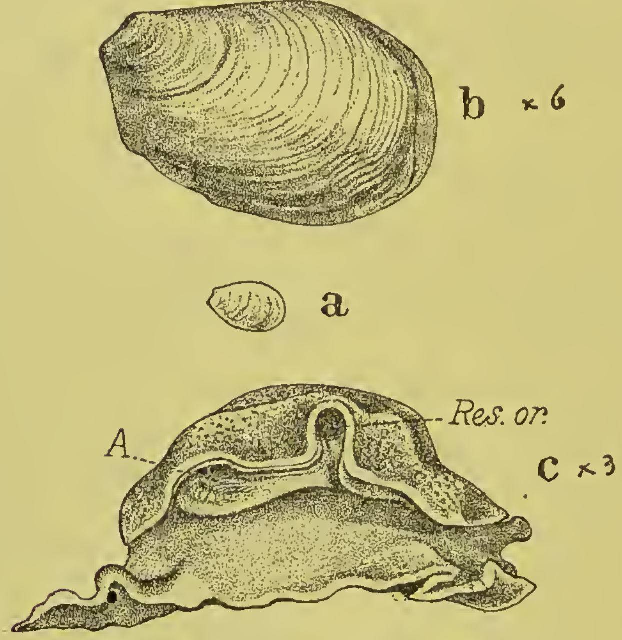

Fig. 163.—*Hyalimax andamanica.*
a, shell (nat. size). *b*, shell (enlarged). *c*, animal.
(Copied from Moll. India.)

flattened wide foot, thin, and spreading at the margin, for in the spirit-specimen it is much wrinkled; the extremity of the foot is pointed, with no mucous gland. There is no defined pallial margin to the foot; distinct grooves run at intervals from the dorsal edge of the mantle to the side of the foot; and two of the specimens show a few distinct dark spots on the upper surface of the extremity of the foot. An indistinct median area on the sole of the foot. Eye-tentacles apparently stout. I am in doubt regarding the oral tentacles; and if present, they are probably small. The mantle is continuous over the shell, and covered with

minute papillæ; there is no division into right and left shell-lobes; the dorsal lobes are very much reduced in size, the right dorsal lobe particularly so, being very narrow and only extending to the posterior margin; the left dorsal lobe is also very narrow, and only just separated from the mantle, terminating on the left anterior side. The respiratory orifice is just behind the centre of the right side of the mantle, a short distance above its lower edge. The anal orifice is some distance (3 mm.) behind it, and concealed by the mantle, its position being quite on the right posterior margin.

"The shell is ovate, thin, flat, transparent, milky white, with close concentric ridges of growth, very thin and delicate on the margin; the apex rather more solid and quadrate at that end, the nucleus being on the right margin.

"Size: major diam. 5 mm., minor diam. 3·3 mm.

"Length of spirit-specimen 16, mantle 11, breadth 5·5 mm."

Hab. Andaman Islands: Port Blair (*Harold Godwin-Austen*).

"*Odontophora, &c.*—The buccal mass is large; the strong retractor muscle has its attachment, together with that of the eye-tentacles, in the usual position at the posterior side of the mantle-margin; but the posterior portion of the buccal mass is very different to what we find in other species; it is more truncate; and that part where the lingual ribbon takes its origin, and which in all species I have hitherto examined presents a shortish blunt knob-like process, in this species is represented by two coils, which are really the posterior edges of the lingual ribbon, turned up on each side and coiled on itself inwards. The lingual ribbon is broader than it is long; and 92 rows were counted, each containing at least 530 teeth:

265 . 1 . 265

"The central tooth is 4-cuspid and much hooked. The laterals are all alike, very gradually becoming smaller on the outside; they bend over in a claw-like form, and are edged with four cusps, of which the two outermost are slightly longer than the two inner; a very minute cusp can just be discerned in some of the largest laterals near the centre, at the exterior base of, and next the first long inner cusp.

"The jaw is very peculiar. It is a very dark umber colour; the cutting or frontal edge forms an oblique angle; and the muscular attachment is very strong and extends back at right angles, equal in length to the width of the jaw, which is T-shaped as in *Succinea*, &c.

"The heart is situated on the left anterior margin of the mantle. The position of the anus is very far back on the right posterior side, quite removed from the neighbourhood of the respiratory orifice, its usual position in most genera; and this is perhaps the most interesting point in the anatomy of this species. The intestine terminates in a large expanded sac just within the aperture.

"*Generative Organs.*—The ovotestis, hermaphrodite duct, and albumen-gland were not made out. The oviduct is much convoluted for a short distance and then extends in a long straight duct to the generative aperture; the prostate is of some length, the vas deferens running parallel to the straight portion of the oviduct down to a short bulbous expansion, to which it is probable the retractor muscle is given off; but this was not found in either specimen examined. The spermatheca is of very great length; a long thin tube terminating in a round ball-like expansion, which is like in this respect to *H. maillardi*. *Hyalimax andamanica*, however, differs from the Bourbon species (1) in the form of the jaw, which has no indication of a central projection; (2) there is considerable divergence in the shell, and I give a drawing of that of *H. perlucidus*, from Mauritius, received by me from Mr. G. Nevill, which shows the apex to be very attenuate and sharp, and

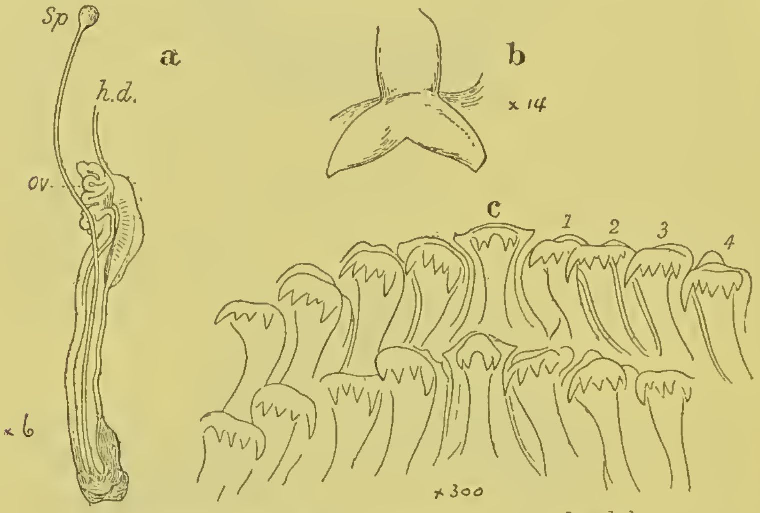

Fig. 164.—*Hyalimax andamanica*. Jaw and radula. (Copied from Moll. India.)

there is a distinct greenish epidermis; (3) the dental formula is different; (4) Fischer does not indicate the position of the anal aperture, which, situated in *H. andamanica* so far back on the posterior right margin, is of extreme importance, so that if otherwise in *Hyalimax* of Bourbon, and in its usual position adjacent to the respiratory orifice, it may render it necessary to place the Indian form in another subgenus, which I would name *Jarava*, from the name of the aboriginal tribe that inhabited the South Andaman Islands. In this case a subfamily HYALIMACINÆ would include 1. *Hyalimax* (*perlucidus*, Isle of France; *mauritianus*, Isle of France; *maillardi*, Bourbon), and 2. *Jarava* (*reinhardi*, Nicobars; *andamanica*, Andamans; *viridis*, Arracan).

"In the form of the buccal mass, the broad radula and its numerous teeth, *andamanica* resembles in a remarkable manner the curiously formed New Zealand slug *Janella antipodarum*, Gray, described and figured by Mr. C. Knight in the 'Transactions of the Linnean Society,' vol. xxii, read June 2, 1859; and they all must be regarded, with *Succinea* and others, as one great group, indicated so well and on such good grounds by Mr. P. Fischer." (*Godwin-Austen.*)

Prof. Cockerell refers to a specimen in the British Museum, labelled "Andaman Islands, Dr. J. Anderson," as being typical, but having the mouth strongly curved, colour yellowish-white, without markings, and the foot slightly orange-tinted.

Var. **punctulata**, *Cockerell.*

Hyalimax andamanica, var. *punctulatus*, Cockerell, A. M. N. H. ser. 6, vi, 1890, p. 389; ibid., The Conchologist, ii, 1893, p. 195.

"Yellowish white; foot slightly orange-tinted. Minute grey specks on mantle and grey streaks on hind part of body." (*Cockerell.*)

Hab. Andaman Islands (*Anderson*).

"The mantle of this specimen is flattish, so that the outline of the slug is greatly depressed compared with the typical one. The jaw does not seem quite like that figured by Godwin-Austen for the type; but I was not able to sufficiently examine it. It seemed to me that it had some sort of central projection. It is possible that *punctulatus* may be a distinct species; but there is not yet sufficient evidence for classing it as such." (*Cockerell.*)

Nevill refers to a new species of *Hyalimax*, found by de Roepstorff at the Andamans *, but he does not describe it, and it is not, therefore, at all impossible that his slug was the same as the present species.

484. **Hyalimax reinhardti**, *Mörch.*

Hyalimax reinhardti, Mörch, Journ. Conchyl. xx, 1872, p. 314; ibid., op. cit., xxiv, 1876, p. 353.
Hyalimax (*Jarava*) *reinhardi*, Godwin-Austen, Moll. India, i, 1882, p. 59.
Hyalimax (*Jarava*) *reinhardti*, Cockerell, The Conchologist, ii, 1893, p. 195.

Original description:—"C. linguæforme, postice acuminatum, pallide increscens [virescens]. Ommatophoria cærulea. Tentacula brevissima. Pallium ellipticum, prasinum, orificis respiratorio in medio marginis dextri sito. Notæum pedis sulcis radiantibus distantibus et sulco obsoleto peripherico circumdatum. Testa scapulæformis, latere dextro recto. Maxillæ crista muscularis angusta, longitudinis fere dimidium maxillæ.

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* J. A. S. B., L, part 2, 1881, p. 142.

"Long. 45 mill.; long. pallii 22 mill.; lat. 11 mill.; long. notæi pedis 17 mill. (*ex icone*)." (*Mörch.*)

Hab. Nicobar Islands: Pulo Panjang and Sambelong.

The species is stated to have been collected on the under side of the leaves of Calderon and other plants with thick leaves. Mörch further mentions that the animal generally remains stationary and contracted, assuming an oval form, and that the muscular attachment of the jaw is narrower and more elongated than in *H. maillardi*, Fischer.

Lieut.-Col. Godwin-Austen considers it very similar to *H. andamanica*, although larger, but until they can be compared together in greater detail he thinks it best to keep them separate.

485. Hyalimax viridis, *Theobald.*

Limax viridis, Theobald, J. A. S. B. xxxiii, 1864, p. 244.
Hyalimax (*Jarava*) *viridis*, Godwin-Austen, Moll. India, i, 1882, p. 60; Cockerell, The Conchologist, ii, 1893, p. 195.

Original description:—"Corpore expanso, pone acuminato, flavo cinereo. Pallio magno, læte colorato viridi-flavo limonis. Tentaculis superioribus, longis, pallidis, oculos parvos nigros gerentibus; et linea pallide smaragdina ad basin notatis. Tentaculis inferioribus minutissimis."

Hab. Burma: Pegu.

"This elegant little *Limax* is very active, and creeps about briskly on the green foliage of the salt swamps, which (*i. e.* the leaves) it resembles in colour." (*Theobald.*)

Lieut.-Col. Godwin-Austen thinks there can be but little doubt, from the above description and the habitat, that the species must find a place here; he also considers it would be interesting to learn how far it extends north, and whether *Hyalimax* occurs in the Sunderbunds.

APPENDIX.

To follow No. 186, p. 213 :—

Plectotropis arakanensis, *Theobald.*

Helix tapeina, var. *arakanensis*, Theobald, Conch. Ind. 1870, pl. 15, fig. 10.

Helix (*Plectrotopis*) *arakanensis*, Nevill. Hand List, i, 1878, p. 73.

Shell conoid, rather narrowly deeply umbilicated, rather solid, rufous corneous, finely and somewhat irregularly striated, densely covered with extremely minute granules above and below. Spire convex, suture impressed in the early whorls, rather shallow in the later ones, apex obtuse. Whorls 5½, the first three rather convex, the later ones becoming gradually flattened and slightly concave near the lower suture, the underside of the last whorl convex, distinctly concave near the sharp keel, which becomes pinched near the aperture, a little dilated behind the peristome, very shortly and slightly descending in front. Aperture oblique, subhastate; margins slightly approximating, united by a very thin callus on the parietal wall; peristome slightly thickened and reflexed, not expanded; the upper margin slightly curved, outer angular, basal arcuate, columellar obliquely ascending, slightly dilated, but scarcely overhanging the moderate umbilicus.

Major diam. 12·75, minor 11·75, alt. 7 mm.

Hab. Burma: Arakan Hills (*Kurz*, *Blanford*); Moulmain (*Stoliczka*).

The present form, regarded as a variety of *P. tapeina* by Theobald, is quite distinct. The umbilicus is narrower, the spire is relatively higher and more convex, the last whorl is not constricted below behind the peristome, the keel is considerably sharper, and instead of close spirals the shell is densely covered with minute granules.

The species has never been described and the foregoing description has been drawn up from a specimen acquired by me years ago at an auction sale with other shells. It was labelled "Burma." The specimen figured in Conch. Ind. is a trifle larger, measuring 13·5 mm. in diameter.

Doubtful and Spurious Records.

Bulimus folliculus, Pfeiffer, Symb. Hist. Helic. iii, 1846, p. 83; ibid., Mon. Helic. Viv. ii, 1848, p. 81; Reeve, Conch. Icon. v, *Bulimus*, 1850, pl. 87, fig. 644.

When described by Pfeiffer, he stated it was received as *Carychium costatum*, Hutton, from Metcalfe. He makes no

further reference to the species in any of the subsequent volumes of the 'Monograph Heliceorum Viventium,' nor does it occur in the 'Nomenclator,' and it must therefore be assumed that he did not admit it as a valid species.

Bulimus pleurophorus, Benson, A. M. N. H. ser. 2, xix, 1857, p. 329.

Further material convinced Benson that the species was erroneously referred to *Bulimus*, and he placed it in *Pomatias* (A. M. N. H. ser. 3, iii, 1859, p. 183).

Hapalus travankoricus, Theobald, J. A. S. B. xlv, 1876, p. 186, pl. 14, fig. 5.

Blanford states (J. A. S. B. xlix, 1880, p. 215) that he is satisfied Theobald's specimens were immature and he believes them to be the young of *Cataulus colcadensis* or some nearly allied species.

Helix (*Theba*) *epiglottidea*, Beck, Index Moll. 1838, p. 15.

Hab. Tranquebar (*nom. nud.*).

Mörch in Journ. Conchyl. xx, 1872, p. 336, states that this is *Helix dehnei*, Rossmässler, a Moroccan species.

Helix hæmatostoma, Crist. & Jan, Mantissa, p. 2. Perhaps a printer's error for *hæmastoma*.

Trochomorphoides conulus, Martens, Godwin-Austen, P. Z. S. 1895, p. 450. A Malay Archipelago species recorded by Godwin-Austen from Katchal, Nicobar Group, on the authority of Roepstorff.

The following are *nomina nuda*:—

Helix mensula, Benson, J. A. S. B. 1857, p. 249.
Helix petila, Benson, *tom. cit.* p. 249.
Helix precaria, Benson, *tom. cit.* p. 250.
Pupa ceylanensis, Nevill, Enum. Helic. Ceylon, 1871, p. 6.
Pupa oleosa, Nevill, *tom. cit.* p. 6.
Pupa solitaria, Nevill, *tom. cit.* p. 6.
Pupa terricolor, Nevill, *tom. cit.* p. 6.
Limax memnon, Nevill, J. A. S. B. xxxiv, 1864, p. 244.

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